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NASA SP-7011 (164)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 164)

FEBRUARY 1977

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NASA SP-7011 (164)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 164)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in January 1977 in

- *Scientific and Technical Aerospace Reports (STAR)*
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 275 reports, articles and other documents announced during January 1977 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1977 Supplements.

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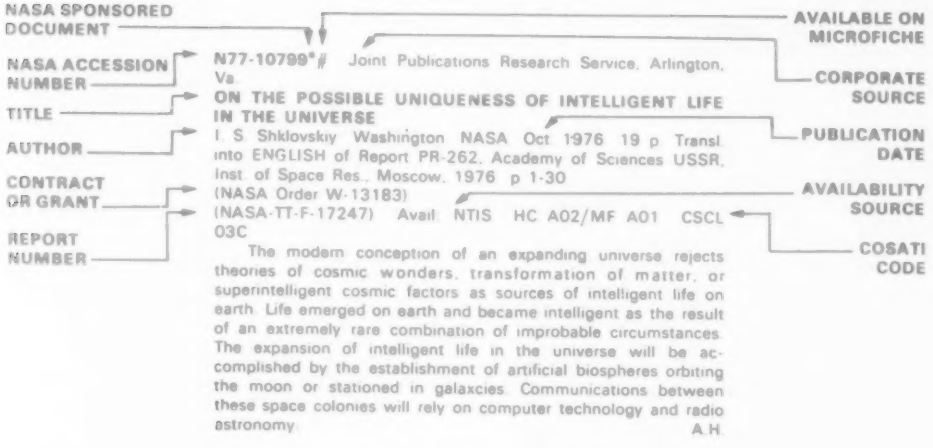
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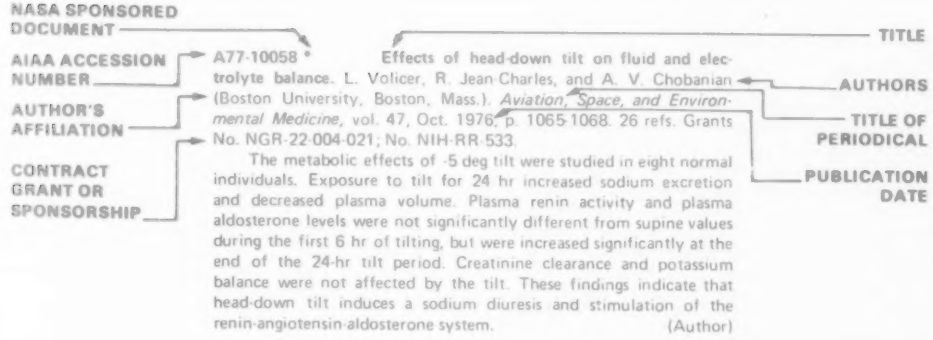
ON THE POSSIBLE UNIQUENESS OF INTELLIGENT LIFE IN THE UNIVERSE
I. S. Shklovskiy. Washington NASA Oct. 1976 19 p. Transl. into ENGLISH of Report PR-262, Academy of Sciences USSR, Inst. of Space Res., Moscow, 1976 p 1-30
(NASA Order W-13183)
(NASA-TT-F-17247) Avail: NTIS HC A02/MF A01 CSCL 03C
The modern conception of an expanding universe rejects theories of cosmic wonders, transformation of matter, or superintelligent cosmic factors as sources of intelligent life on earth. Life emerged on earth and became intelligent as the result of an extremely rare combination of improbable circumstances. The expansion of intelligent life in the universe will be accomplished by the establishment of artificial biospheres orbiting the moon or stationed in galaxies. Communications between these space colonies will rely on computer technology and radio astronomy.
A.H.

TYPICAL CITATION AND ABSTRACT FROM *IAA*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A77-10058 * Effects of head-down tilt on fluid and electrolyte balance. L. Volicer, R. Jean-Charles, and A. V. Chobanian (Boston University, Boston, Mass.). Aviation, Space, and Environmental Medicine, vol. 47, Oct. 1976, p. 1065-1068. 26 refs. Grants No. NGR-22-004-021; No. NIH-RR-533.
The metabolic effects of -5 deg tilt were studied in eight normal individuals. Exposure to tilt for 24 hr increased sodium excretion and decreased plasma volume. Plasma renin activity and plasma aldosterone levels were not significantly different from supine values during the first 6 hr of tilting, but were increased significantly at the end of the 24-hr tilt period. Creatinine clearance and potassium balance were not affected by the tilt. These findings indicate that head-down tilt induces a sodium diuresis and stimulation of the renin-angiotensin-aldosterone system.
(Author)

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 164)

FEBRUARY 1977

IAA ENTRIES

A77-10051 **Readability of approach charts as a function of visual acuity, luminance, and printing format.** K. W. Welsh, J. A. Vaughan, and P. G. Rasmussen (FAA, Aeronautical Center, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1027-1031. 10 refs.

This study determined the ability of 12 presbyopic subjects to read numerals from aeronautical approach procedure charts. The readability of chart numerals was determined for 15 size and contrast combinations as a function of near visual acuity (equivalent 20/20, 20/40, and 20/60) and chart brightness (100 and 1.0 ft L). Test subjects were evaluated at the normal near-visual-acuity level (20/20) and the minimal near-visual-acuity levels (20/40 for Classes I and II and 20/60 for Class III) as specified in the FAA's Guide for Aviation Medical Examiners. The results indicated that subjects with 20/20 near visual acuity could read all chart numerals under bright and dim luminance conditions. Subjects with 20/40 and 20/60 levels of near visual acuity experienced reading difficulty under bright conditions and increased difficulty under dim luminance. (Author)

A77-10052 **Pulmonary gas exchange in acute mountain sickness.** J. R. Sutton, A. C. Bryan, G. W. Gray, E. S. Horton, A. S. Rebuck, W. Woodley, I. D. Rennie, and C. S. Houston (McMaster University, Hamilton, Ontario; North America, Arctic Institute, Yukon; Defence and Civil Institute of Environmental Medicine, Toronto, Canada; Vermount, University, Burlington, Vt.). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1032-1037. 31 refs. Grant No. NIH-HL-14102-05.

The severity of acute mountain sickness (AMS) was investigated in healthy volunteers, airlifted to high altitude (5,360 m). Blood gases were measured at 2,990 m and 5,360 m. Symptoms of AMS were found in all subjects, but ranged from malaise to vomiting with intractable headache. The clinical severity of AMS was directly related to the arterial P(CO2) and inversely to pH, but unrelated to the P(O2) on arrival at high altitude. However, P(O2) fell and was lowest 48 hr after arrival at high altitude in those subjects with the most severe AMS. These were the only subjects to show an increase in the alveolar-arterial P(O2) difference and in the venous admixture ratio during the first 48 hr. These abnormalities in gas exchange, which developed in the subjects with the most marked cerebral symptoms, suggest that the manifestations of cerebral and pulmonary dysfunction at altitude develop simultaneously, a finding that suggests coexisting cerebral and pulmonary edema. (Author)

A77-10053 **Measurement of change in plasma volume during heat exposure and exercise.** M. H. Harrison and R. J. Edwards (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1038-1045. 17 refs.

The application of radio-iodinated human serum albumin (RISA) to the measurement of a continuously changing plasma volume, such as that occurring during heat exposure and exercise, has been considered in terms of the exchange dynamics of albumin between the intravascular and extravascular compartments. In six male subjects resting supine for 2 hr in a hot environment, or exercising for 50 min in a thermoneutral or hot environment, there was no statistically significant alteration in the rate of protein efflux from the intravascular space. However, following exercise, protein was added to the circulation at a greater rate than it was lost through the capillary walls. A technique for calculating plasma volume from a single measurement of plasma RISA activity is described. This may be used in conjunction with measurements of changes in hemoglobin concentration for determining plasma volume in situations where alterations in protein exchange dynamics do occur. (Author)

A77-10054 **Cardiac output during human sleep.** J. C. Miller and S. M. Horvath (California, University, Santa Barbara, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1046-1051. Grant No. AF-AFOSR-73-2455.

Impedance cardiogram and sleep EEG were recorded from four male and four female subjects, aged 21 to 22 years, during one night in the laboratory following one adaptation night. Cardiac output fell approximately 26% during the night as a consequence of diminished stroke volume, the lowest values of both occurring during the latter portion of the night, dominated by SREM (rapid-eye-movement stage). Intracycle comparisons between SREM and SWS (slow-wave sleep) or between eye movement burst and non-burst SREM shows no significant differences in stroke volume or cardiac output. Pre-ejection period and systolic ejection period were measured and discussed. The noncoincidence of the nadir of metabolic activity, expressed as cardiac output, and the apex of slow-wave sleep activity supported the concept of slow-rate sleep as a period of physiological restoration. (Author)

A77-10055 **Intracerebral oxygen and carbon dioxide tensions in the rhesus monkey.** J. A. Kennealy, F. P. Witte, R. D. Brown, J. S. Kirkland, and A. A. Karl (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB; Systems Research Laboratories, Inc., Dayton, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1052-1055. 18 refs.

Five rhesus monkeys (M. mulatta) were prepared by surgical placement of a stainless steel implant in the parietal area of the skull. The implant was designed to firmly hold a Teflon-coated membrane of a medical mass spectrometer in an intracerebral position. Animals were consecutively exposed to varying ambient oxygen concentrations from 11% to 21%. Intracerebral P(O2) and P(CO2) and arterial P(O2) were all simultaneously recorded for computer analysis. Results indicate an almost linear relationship between cerebral P(O2) and ambient P(O2) as well as between cerebral P(O2) and arterial P(O2). With an ambient oxygen concentration of 21%, the cerebral P(O2) and P(CO2) were 13.5 plus or minus 3.5 mm Hg and 50.4 plus or minus 7.9 mm Hg, respectively. With an ambient oxygen concentration of 10.7%, these values decreased to 2.5 plus or minus 2.7 mm Hg and 38.0 plus or minus 5.6 mm Hg. (Author)

A77-10056 * **Medical experiment M-171 - Results from the second manned Skylab mission.** J. A. Rummel, E. L. Nichel, C. F. Sawin, and M. C. Buderer (NASA, Johnson Space Center; Technology, Inc., Life Sciences Div., Houston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1056-1060. 6 refs.

Preflight, inflight, and postflight exercise response tests were conducted on the astronauts of the second Skylab mission as part of an evaluation of physiological adaptation to long-term weightlessness. The flight phase of this mission was 59 days in duration. An exercise protocol was designed around a bicycle ergometer which was used to apply work loads approximating 25, 50, and 75% of each crewman's measured maximum aerobic capacity. Respiratory gas exchange, heart rate, and blood pressure were measured during all tests; cardiac output was measured at selected times during preflight and postflight tests. Data obtained both at rest and during exercise in flight showed no consistent changes which would indicate a degraded physical work capacity. In fact, heart rate during exercise actually decreased for all crewmen in flight. This response indicated improved physical fitness in flight relative to preflight. The postflight period of readaptation to 1 G was characterized by a marked tachycardia, during which time stroke volume was decreased. This response returned to normal within 5-day postflight. (Author)

A77-10057 **Free amino acids in human blood plasma during space flights.** A. S. Ushakov and T. F. Vlasova (Ministry of Health of USSR, Institute of Biomedical Problems, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1061-1064. 14 refs.

The present investigation presents results of studying free amino acids of peripheral plasma in cosmonauts who made space flights of different duration onboard the spacecraft Soyuz-12, Soyuz-16 and the orbital station Salyut-4. The study showed changes in the content of free amino acids which varied for different amino acids. Most pronounced changes were found in the content of glutamic and aspartic acids, sulfur-containing amino acids, and arginine. (Author)

A77-10058 * **Effects of head-down tilt on fluid and electrolyte balance.** L. Volicer, R. Jean-Charles, and A. V. Chobanian (Boston University, Boston, Mass.). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1065-1068. 26 refs. Grants No. NGR-22-004-021; No. NIH-RR-533.

The metabolic effects of -5 deg tilt were studied in eight normal individuals. Exposure to tilt for 24 hr increased sodium excretion and decreased plasma volume. Plasma renin activity and plasma aldosterone levels were not significantly different from supine values during the first 6 hr of tilting, but were increased significantly at the end of the 24-hr tilt period. Creatinine clearance and potassium balance were not affected by the tilt. These findings indicate that head-down tilt induces a sodium diuresis and stimulation of the renin-angiotensin-aldosterone system. (Author)

A77-10059 **Increased 2,3-diphosphoglycerate during normocapnic hypobaric hypoxia.** A. Cymerman, J. T. Maher, J. C. Denniston (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.), J. T. Reeves, R. F. Grover (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Colorado, University, Denver, Colo.), and J. C. Cruz. *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1069-1072. 15 refs.

The effect of 96 hr of exposure to hypobaric hypoxia with and without 3.8% CO2 supplementation was studied in two groups of subjects. Five subjects (CO2) were exposed to 440-465 mm Hg barometric pressure (4000-4400 m), and 4 subjects (no-CO2) were exposed to 455-492 mm Hg (3500-4100 m) in order to produce similar levels of resting end-tidal P(O2). After 24 hr, 2,3-DPG (diphosphoglycerate) levels of both groups significantly increased and remained elevated. The CO2 group had higher levels than the no-CO2 group after 48 and 72 hr. Concurrent measurements of P(50) showed similar changes over the same time course. Mean corpuscular hemoglobin concentrations remained normal for 48 hr and then decreased in both groups, the CO2 group showing the larger decrease. It is concluded that altitude exposure may produce an increase in 2,3-DPG without the presence of respiratory alkalosis previously thought necessary. (Author)

A77-10060 **Responses of the autonomic nervous system during acclimatization to high altitude in man.** M. S. Malhotra, V. Selvamurthy, S. S. Purkayastha, A. K. Mukherjee, L. Mathew, and G. L. Dua (Defence Institute of Physiology and Allied Sciences, Delhi, India). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1076-1079. 12 refs.

A study has been conducted on 20 sojourners aged 20-30 yr to evaluate responses of the autonomic nervous system during acclimatization to high altitude. The responses measured consisted of heart rate (HR), blood pressure (BP), oral temperature (Tor), mean skin temperature (Tsk), cold pressor response (CPR), orthostatic tolerance to tilt, and urinary catecholamines. The subjects were tested initially at an altitude of 260 m and then on acute induction to an altitude of 3500 m periodically for 3 weeks. For comparison, the same responses were studied on acclimatized lowlanders and high-altitude natives. The studies showed a rise in HR, BP, Tor, and urinary catecholamines, and a fall in Tsk, CPR, and orthostatic tolerance immediately on arrival at HA, indicating a relative hyperactivity of the sympathetic system. After a stay of 1 week, there was a gradual recovery in all the responses, though sympathetic hyperactivity was still maintained throughout the 3 weeks of stay. It is concluded that in lowlanders it takes more than a year of stay at altitude for complete recovery of autonomic balance. (Author)

A77-10061 **Effect of penetrating radiation on skeletal muscles of rats in weightlessness.** N. V. Petrova and V. V. Portugalov (Ministry of Health of USSR, Institute of Biomedical Problems, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1080-1082. 12 refs.

The isoenzyme composition of lactate dehydrogenase of soleus and plantaris muscles of rats flown for 20.5 days aboard the biosatellite Cosmos-690 and irradiated with a dose of 800 rad was investigated. The muscles exposed to weightlessness per se and weightlessness combined with radiation showed similar changes in their carbohydrate metabolism. On return to 1 G, readaptation of irradiated rats developed less rapidly than of animals exposed to weightlessness alone. (Author)

A77-10062 **Antiorthostatic hypokinesia as a method of weightlessness simulation.** L. I. Kakurin, V. I. Lobachik, V. M. Mikhailov, and Iu. A. Senkevich (Ministry of Health of USSR, Institute of Biomedical Problems, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1083-1086. 11 refs.

Physiological effects observed in 8 test subjects during a 5-day bedrest experiment in the head-down position (0, -4, -8, -12 deg) were studied. It was shown that the antiorthostatic hypokinesia at -12 deg could reproduce physiological responses shown by space crewmembers more closely than recumbent bedrest. The observations help simulate an acute stage of human adaptation to the weightless state and to assess the part played by gravity-induced blood redistribution in the development of physiological changes. (Author)

A77-10063 **Psychologic and psychophysiologic response to 105 days of social isolation.** D. A. Rockwell, M. G. Hodgson, J. R. Beljan, and C. M. Winget (California, University, Davis, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Oct. 1976, p. 1087-1093. 38 refs.

The responses of nine subjects to 105 days of social isolation are reported. The study reveals that crew selection plus ongoing support

by psychiatric staff permits continued function in an exotic milieu. Prediction of psychophysiologic symptoms was possible using paper and pencil tests. Trait anxiety was altered by the isolation in a psychologically healthy direction. Sudden time shifts of 8 hr led to an immediate significant increase in depression, aggression, and hostility, and are accompanied by marked increases in physical symptoms. During the first free-running phase of the experiment, significant shifts were found on four psychological measures. The shifts indicate that subjects became less trusting, more orderly, more routinized, less energetic, and more depressed. A reducer-augmenter scale predicted the number of psychophysiologic complaints reported by individual subjects while isolated. A group interaction effect on circadian rhythms was isolated but needs further examination. (Author)

A77-10064 * **Prevention of experimental motion sickness by scopolamine absorbed through the skin.** A. Graybiel, J. Knepton, and J. Shaw (U.S. Navy, Aerospace Medical Research Laboratory, Pensacola, Fla.; Alza Research, Palo Alto, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 47, Oct. 1976, p. 1096-1100. 16 refs. Navy Project MF52,524,005-7015; NASA Order T-5904-B.

A double-blind placebo-controlled study compared the efficacy of the antimotion sickness drug scopolamine when administered by oral or transdermal routes. A secondary purpose was to extend our bioassay involving fixed-dose combinations of the homergic drugs promethazine and ephedrine. After receiving 12 apparently identical drug-placebo treatments, eight normal male students were exposed in a slow rotation room to stressful accelerations generated by their execution of 40 head movements out of the plane of the room's rotation at 1 rpm and at 1-rpm increments until either symptoms were experienced (just short of frank motion sickness) or the 27-rpm ceiling on the test was reached. Efficacy of a drug was defined in terms of the placebo-range and categorized as beneficial, inconsequential, or detrimental. The only detrimental effect was with scopolamine given orally. It is concluded that the advantages of the transdermal scopolamine, which include minimal side effects and prolonged effectiveness, deserve full exploitation. (Author)

A77-10065 **Effects of rapid round trips against time displacement on adrenal cortical-medullary circadian rhythms.** C. Sekiguchi, T. Kuta-Jima, Y. Ueda (Jikei University, Tokyo, Japan), and O. Yamaguchi (Japan Airlines Co., Ltd., Health Control Services, Tokyo, Japan). *Aviation, Space, and Environmental Medicine,* vol. 47, Oct. 1976, p. 1101-1106. 22 refs. Research supported by the Japan Civil Aviation Promotion Foundation.

The effects of rapid round trips against the displacement on circadian rhythms was investigated. The study was carried out on three occasions using one volunteer healthy physician on east-west trips (Tokyo-San Francisco-Tokyo) of short and prolonged stays. The control study was performed on a north-south trip (Tokyo-Sydney-Tokyo) which had practically no time displacement. The circadian rhythms of urinary 17-OHCS (hydrocorticosteroids), 17-KS, and noradrenaline excretions and plasma cortisol in short-stay trips were disrupted and not synchronized; however, the recovery was rapid with the circadian rhythms returning to normal within 1 and 2 days. On the other hand, the circadian rhythms of these variables in the control study were not disrupted. These results suggest that a short, overnight stay during the trip minimizes the ill effects due to time displacement. (Author)

A77-10066 **Food sanitation and air safety.** A. S. R. Peffers (British Airways, Medical Services, London, England). *Aviation, Space, and Environmental Medicine,* vol. 47, Oct. 1976, p. 1107, 1108.

Ways in which poor hygiene or unsatisfactory disposal of food wastes may influence aircraft safety are identified. A major food hazard is the sudden incapacitation or collapse of a member of the operating crew with short incubation fulminating type of food poisoning due to bacterial toxins as seen in some staphylococcal infections. Rats may gain access to aircraft by inefficient disposal of aircraft wastes and may damage electrical or control wire conduits. Flies attracted by open food waste or garbage may contaminate food being prepared for use in aircraft or in airport restaurants where crew and passengers take refreshments. Fifteen key safety steps to be taken by aviation medicine workers and aircraft operators are mentioned. S.D.

A77-10067 **Transportation in commercial aircraft of passengers having contagious diseases.** M. Perin (Compagnie Nationale Air France, Paris, France). *Aviation, Space, and Environmental Medicine,* vol. 47, Oct. 1976, p. 1109-1113. 22 refs.

Most airlines refuse to board passengers known or believed to have contagious diseases. Such rigor can scarcely be justified by reference to either laws or regulations. It introduces the risk of arbitrary, mistaken, or prejudiced conduct in areas in which international organizations recommend the greatest liberalization, and it can cause serious harm to certain patients. Normal hygienic conditions aboard planes suppress the risks of contagion concerning most diseases transmitted by insects or through contact with the skin, with mucuous membranes, with the faeces, or with urine. Airlines should continue to refuse to transport only those passengers having diseases which are characterized by vomiting or serious diarrhea or which are transmitted through the air if it is impossible by simple means to avoid the risk of contaminating other travellers and any members of the flight crew who might be receptive. (Author)

A77-10068 **Exercise in an hypoxic environment as a screening test for ischaemic heart disease.** P. K. Khanna, S. K. Dham (Army Hospital, Delhi, India), and R. S. Hoon (Ministry of Defence, Armed Forces Medical Services, New Delhi, India). *Aviation, Space, and Environmental Medicine,* vol. 47, Oct. 1976, p. 1114-1117. 20 refs.

In 30 subjects with stabilized ischaemic heart disease (Group A) and 70 subjects with abnormal resting electrocardiogram (Group B), resting electrocardiograms - at ground level and at a simulated height of 4592 m (15000 ft) - after 40-min exposures were recorded. The double Master's two-step exercise test (DM) was performed at ground level as well as at simulated height (DMH). In the ischaemic group, exercise combined with hypoxia did not yield better results than exercise alone; but among the asymptomatic subjects, exercise in an hypoxic environment gave significantly better results than exercise alone (less than 0.005) or hypoxia alone (p less then 0.01). Those with negative responses to the test have been employed on strenuous duties, including employment at high altitude for the last 3 years. None of them have manifested any objective or subjective evidence of ischaemic heart disease. DM exercise testing in an hypoxic environment is suggested to be a reliable method to assess subjects with abnormal electrocardiogram and evaluate their functional status. (Author)

A77-10113 **Central nervous regulation of body temperature during sleep.** S. F. Glotzbach and H. C. Heller (Stanford University, Stanford, Calif.). *Science,* vol. 194, Oct. 29, 1976, p. 537-539. 36 refs. Grant No. NIH-NS-10367.

The relationship between hypothalamic temperature and metabolic heat production was measured during wakefulness, slow-wave sleep, and paradoxical sleep in unrestrained kangaroo rats (Dipodomys). Hypothalamic temperature was manipulated with chronically implanted, water-perfused thermodes while cortical electroencephalogram, electromyogram, metabolic rate, and body movement were continuously recorded. During slow-wave sleep, in comparison to wakefulness, there is a lowered threshold hypothalamic temperature for the metabolic heat production response and a lowered proportionality constant relating rate of metabolic heat production to hypothalamic temperature. During paradoxical sleep

no increase in metabolic heat production could be elicited by lowering hypothalamic temperature, which indicates that the thermoregulatory system is inoperative. (Author)

A77-10123 **Ridge and Bayes identification for the quasi-linear human controller in compensatory tracking.** T. O. Kvalseth (Norges Tekniske Hogskole, Trondheim, Norway). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-6, Oct. 1976, p. 705-708. 8 refs. NSF Grant No. GK-37419.

The ridge and Bayes regression techniques as a tool for system identification are presented. The application of this method is illustrated for the problem of estimating the impulse response sequence of a time-discrete human controller in a compensatory tracking task. The estimates obtained are compared with the ordinary least squares estimates based on data from one experimental run. (Author)

A77-10137 * **Influence of auditory fatigue on masked pure-tone thresholds.** D. E. Parker, R. L. Tubbs, P. A. Johnston, and L. S. Johnston (Miami University, Oxford, Ohio). *Acoustical Society of America, Journal*, vol. 60, Oct. 1976, p. 881-885. 8 refs. Research supported by Miami University; Contracts No. F33615-73-C-4002; No. NAS9-14358.

A description is presented of four related experiments involving conditions of 3-kHz low-intensity masking, a replication of experiment I with slight variations, 3-kHz high-intensity masking, and 6-kHz low-intensity masking. The frequencies of the tones which the observers detected were 3 and 6 kHz. The observed change in masked-tone threshold as a function of fatigue is discussed. It is found that masked-tone-detection thresholds remain essentially unchanged following fatigue if the masking-noise intensity is sufficiently great. G.R.

A77-10138 **Identification of vowels excerpted from /l/ and /r/ contexts.** Z. B. Bond (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Acoustical Society of America, Journal*, vol. 60, Oct. 1976, p. 906-910. 8 refs. USAF-sponsored research.

Two experiments were conducted investigating the identifiability of vowels excerpted from context. Five phonetic contexts were investigated: neutral (h-d), initial and final /l/, and initial and final /r/. Vowels were excerpted from these contexts by computer and presented to subjects for identification. The consonantal contexts of initial and final /r/ and /l/ affected the identification of the excerpted vowels in various systematic ways, as compared with the identification patterns of vowels excerpted from the neutral context. (Author)

A77-10139 **Separation of speech from interfering speech by means of harmonic selection.** T. W. Parsons (Nicolet Scientific Corp., Northvale, N.J.). *Acoustical Society of America, Journal*, vol. 60, Oct. 1976, p. 911-918. 12 refs. Contract No. F30602-74-175-C.

A common type of interference in speech transmission is that caused by the speech of a competing talker. Although the brain is adept at clarifying such speech, it relies heavily on binaural data. When voices interfere over a single channel, separation is much more difficult and intelligibility suffers. Clarifying such speech is a complex and varied problem whose nature changes with the moment-to-moment variation in the types of sound which interfere. This paper describes an attack on the principal subproblem, the separation of vocalic speech. Separation is done by selecting the harmonics of the desired voice in the Fourier transform of the input. In implementing this process, techniques have been developed for resolving overlapping spectrum components, for determining pitches of both talkers, and for assuring consistent separation. These techniques are described, their performance on test utterances is summarized, and the possibility of using this process as a basis for the solution of the general two-talker problem is briefly considered. (Author)

A77-10147 * **An automated miniaturized Haploscope for testing binocular visual function.** T. A. Decker, R. E. Williams, C. L. Kuether, and D. Wyman-Cornsweet (Baylor University, Houston, Tex.). *Optical Engineering*, vol. 15, July-Aug. 1976, p. 296-303. 6 refs. Research supported by the Brown Foundation; Grants No. NGR-44-012-099; No. NGR-44-003-057.

A computer-controlled binocular vision testing device has been developed as one part of a system designed for NASA to test the vision of astronauts during spaceflight. The device, called the Mark III Haploscope, utilizes semi-automated psychophysical test procedures to measure visual acuity, stereopsis, phorias, fixation disparity and accommodation/convergence relationships. All tests are self-administered, yield quantitative data and may be used repeatedly without subject memorization. Future applications of this programmable, compact device include its use as a clinical instrument to perform routine eye examinations or vision screening, and as a research tool to examine the effects of environment or work-cycle upon visual function. (Author)

A77-10148 * **Objective and automated measurement of dynamic vision functions.** M. C. Flom and A. J. Adams (California, University, Berkleley, Calif.). *Optical Engineering*, vol. 15, July-Aug. 1976, p. 304-307. 12 refs. Grants No. NGR-05-024-005; No. DADA17-72-C-2083.

A phoria stimulus array and electro-oculographic (EOG) arrangements for measuring motor and sensory responses of subjects subjected to stress or drug conditions are described, along with experimental procedures. Heterophoria (as oculomotor function) and glare recovery time (time required for photochemical and neural recovery after exposure to a flash stimulus) are measured, in research aimed at developing automated objective measurement of dynamic vision functions. Onset of involuntary optokinetic nystagmus in subjects attempting to track moving stripes (while viewing through head-mounted binocular eyepieces) after exposure to glare serves as an objective measure of glare recovery time. R.D.V.

A77-10149 **A portable filter anomaloscope.** T. P. Piantanida (Florida, State University, Tallahassee, Fla.). *Optical Engineering*, vol. 15, July-Aug. 1976, p. 325-327.

The author's own design of a portable field-use anomaloscope for examination of color vision genotype/phenotype characters in color matching by protanomalous and deuteranomalous subjects is described. Design features and test procedures are related in detail. Constraints on device design are indicated (accuracy and reliability in distinguishing between 7-9 color vision phenotype responses, in aiding detection of heterozygosity in carriers of defective color vision, compactness and ruggedness, low cost, adaptability to various power supplies encountered in fieldwork). Anomaloscopy is compared briefly to other color vision tests that fail to rule out extraneous variable (quality of illuminant). R.D.V.

A77-10223 **The influence of the position of the oxygen dissociation curve on oxygen-dependent functions of the isolated perfused rat liver. II - Studies at different levels of hypoxia induced by decrease of blood flow rate.** J. C. Bakker, G. C. Gortmaker, and F. G. J. Offerijns (Netherlands Red Cross Blood Transfusion Service, Amsterdam, Netherlands). *Pflügers Archiv*, vol. 366, no. 1, 1976, p. 45-52. 29 refs.

A77-10224 **The assessment of position of stationary targets perceived during saccadic eye movement.** M. Gresty and J. Leech (National Hospital, London, England). *Pflügers Archiv*, vol. 366, no. 1, 1976, p. 83-88. 21 refs.

An experiment was performed to establish the accuracy with which visual targets perceived during saccadic eye movement are localized. Subjects were presented with the task of executing saccades of 30 deg plus amplitude, passing through primary gaze; about the time of peak velocity, a 5-ms red flash was presented at

some random position on a horizontal visual display. Subjects were required to indicate the direction in which they thought the flash was localized by fixating in that direction. Targets were localized with an average error of 5 to 6 deg, although the variance was high. No systematic differences were found between conditions or subjects. Error was unrelated to saccade velocity. It is concluded that during saccadic eye movements, the appreciation of target position is maintained with an acceptable degree of accuracy. (Author)

A77-10250 **Impact of radar irradiation on human systems.** K. Natarajan and N. Jagannathan (Indian Space Research Organization, Vikram Sarabhai Space Center, Trivandrum, India). *Institution of Electronics and Telecommunication Engineers, Journal*, vol. 22, May 1976, p. 326-329. 6 refs.

A77-10273 **Visibility of traffic control devices - Catering for the real observer.** A. W. Johnston, B. L. Cole, R. J. Jacobs, and A. J. Gibson (Melbourne, University, Melbourne, Australia). *Ergonomics*, vol. 19, Sept. 1976, p. 591-609. 27 refs. Research supported by the Australian Road Research Board and Department of Civil Aviation.

It is argued that deficiencies of vision are sufficiently common and sufficiently profound in an unselected population to render it unwise to base the design of visual displays for man-machine systems on data obtained using unrepresentative samples of observers selected to exclude those with visual defects. A series of experiments is reviewed which investigated signal recognition by observers with defective color vision, contrast detection by observers with normal and blurred vision, and the effect of blurred vision on the legibility of alphanumeric and symbolic information displays (standard road signs). It is concluded that the ergonomic design of visual displays in transport systems should be an optimization of engineering design and population selection. F.G.M.

A77-10274 **Drug effects on heart rate and heart rate variability during a prolonged reaction task.** A. W. K. Gaillard (Central Organization for Applied Scientific Research in the Netherlands TNO, Institute for Perception TNO, Soesterberg, Netherlands) and D. A. Trumbo. *Ergonomics*, vol. 19, Sept. 1976, p. 611-622. 16 refs.

Effects of task difficulty, time on task, an amphetamine, and a barbiturate on heart rate during prolonged test sessions are investigated. In the experiment reported, eight pairs of male subjects performed serial reaction tests over the course of three hours on different days. At each session, the subjects were given an amphetamine derivative, a barbiturate, a placebo, or no medication. The time between successive heart beats was measured, and four different test scores were computed. The results show that both time on task and the amphetamine apparently acted directly on heart rate, while the barbiturate and task difficulty influenced heart rate indirectly through increased mental effort. The time-on-task results are shown to suggest a loss of activation over time. F.G.M.

A77-10341 **Duration of whole-body vibration exposure - Its effect on comfort.** M. J. Griffin and E. M. Whitham (Southampton, University, Southampton, England). *Journal of Sound and Vibration*, vol. 48, Oct. 8, 1976, p. 333-339. 13 refs.

An experiment was conducted to determine whether the relative discomfort produced by 4 Hz and 16 Hz sinusoidal whole-body vertical vibration was dependent on the duration of the vibration exposure. Each of eight seated subjects was exposed to 36-minute vibration sessions using an electrodynamic vibrator, both sessions consisting of ten-second periods of 4 Hz and 16 Hz vibration alternating continuously. Subjects were required to control the intensity of the test motion to compensate for periodic changes in its intensity made by the experimenter. It was found that the relationship between the average levels of the two motions when adjusted to produce similar discomfort was independent of vibration duration. B.J.

A77-10600 # **Psychomotor test performance and sleep patterns of aircrew flying transmeridional routes.** L. Buck (National Research Council, Control Systems and Human Engineering Laboratory, Ottawa, Canada). *Canada, National Research Council, Division of Mechanical Engineering and National Aeronautical Establishment, Quarterly Bulletin*, no. 2, 1976, p. 19-33. 17 refs.

Pilots and flight attendants flying scheduled services between Vancouver and Tokyo and between Toronto and Rome were tested on a tracking task before and after flights in each direction. Flights were included in schedules involving both 24-hour and 7-day layovers at the overseas station. During these periods they recorded their sleep patterns. The data showed that following flight subjects made an immediate attempt to adapt their behaviour to local time and that changes in their performance scores could be interpreted on that basis. It was concluded that behavioural circadian rhythms adapt rapidly to a new time-zone. (Author)

A77-10651 # **Preliminary results of morphological and cytochemical studies on animals after a stay of 22 days in space flight aboard the Cosmos 605 satellite (Predvaritel'nye itogi morfologicheskikh i tsitokhimicheskikh issledovanii zhivotnykh, nakhodivshikhsia 22 sutok v kosmicheskom polete na bortu ISZ 'Kosmos-605').** V. V. Portugalov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, May-June 1976, p. 418-429. In Russian.

Histological and cytochemical methods are used to study the condition of vital organ systems in rats who have completed a 22-day orbital flight aboard the Cosmos 605 satellite. It is found that the most pronounced changes occurred in the muscular, lymphoid, hematopoietic, osteal, and other relevant tissues. The observed changes were not specific to space flight and might be obtained during experiments on animals under ground-based conditions. The changes were essentially reversible and virtually disappeared by the 27th postflight day. S.D.

A77-10652 # **Biophysical analysis of the action of Coriolis acceleration on the vestibular analyzer (Biofizicheskii analiz deistviia uskorenii Koriolisa na vestibuliarnyi analizator).** E. V. Lapaev and N. B. Platonov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, May-June 1976, p. 449-452. 7 refs. In Russian.

Coriolis acceleration as an adequate stimulus of the vestibular analyzer is regarded as one of the possible causes for the occurrence of motion sickness. Results are presented for a biophysical analysis of the action of the Coriolis acceleration on the vestibular analyzer. It is theoretically shown that rotational acceleration and Coriolis acceleration have a similar physical structure. An analogy between Coriolis acceleration and normal acceleration is also demonstrated. Both the horizontal and vertical semicircular canals and the otolith system are shown to be subject to stimulation. Experimental studies on rabbits revealed that the basic trigger mechanism for the onset of vestibular responses to Coriolis acceleration is the rotational moment resulting from a difference between the magnitudes of the Coriolis acceleration at different points of the semicircular canals. S.D.

A77-10661 # **Effect of hydrocortisone and adrenocorticotropin on the conformational state of proteins in the brain and muscles (Do pitannia pro vpliv gidrokortizona i adrenokortikotropnogo gormona na konformatsiinii stan bilkiv golovnogo mozku ta m'iaziv).** A. Ia. Mestechkina, L. M. Kalins'ka, and V. I. Kravchenko (Kiivs'kii Naukovo-Doslidnii Institut Endokrinologii ta Obminu Rechovin, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologichni, Khimichni ta Biologichni Nauki*, Aug. 1976, p. 730-733. 14 refs. In Ukrainian.

A77-10700 * Studies on the nature of plasma growth hormone. S. Ellis, R. E. Grindeland, T. J. Reilly, and S. H. Yang (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). In: Growth hormone and related peptides: Proceedings of the Third International Symposium, Milan, Italy, September 17-20, 1975. Amsterdam, Excerpta Medica (Excerpta Medica International Congress Series, No. 381), 1976, p. 75-83. 8 refs.

The paper presents further evidence for the existence of two discrete forms of growth hormone in human plasma, one which is detectable by both radioimmunoassay and bioassay and is immunoreactive, and the other, termed 'bioactive', which is detected by tibial bioassay but shows little reactivity with currently available antisera to pituitary growth hormone. The same division of immunoactive and bioactive growth hormone occurs in rats, though with less disparity. Tests on rats indicated that the bioactive hormone is preferentially released into jugular vein plasma and that plasma concentrations of the bioactive hormone can be enhanced by insulin administration. The bioactive hormone was detectable by tibial assays in Cohn fractions IV, IV-1, and IV-4, and could be concentrated about 40-fold by fractionation with (NaPO3)6 and (NH4)2SO4. P.T.H.

A77-10702 * Halobacterium saccharovorum sp. nov., a carbohydrate-metabolizing, extremely halophilic bacterium. G. A. Tomlinson (Santa Clara, University, Santa Clara, Calif.) and L. I. Hochstein (NASA, Ames Research Center, Moffett Field, Calif.). *Canadian Journal of Microbiology*, vol. 22, no. 4, 1976, p. 587-591. 12 refs. Contract No. NCAR-685-412.

The previously described extremely halophilic bacterium, strain M6, metabolizes a variety of carbohydrates with the production of acid. In addition, the organism produces nitrite (but no gas) from nitrate, is motile, and grows most rapidly at about 50 C. These characteristics distinguish it from all previously described halophilic bacteria in the genus Halobacterium. It is suggested that it be designated as a new species, Halobacterium saccharovorum. (Author)

A77-10703 * Light-induced membrane potential and pH gradient in Halobacterium halobium envelope vesicles. R. Renthal and J. K. Lanyi (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.). *Biochemistry*, vol. 15, no. 10, 1976, p. 2136-2143. 37 refs.

A77-10704 * Light-induced glutamate transport in Halobacterium halobium envelope vesicles. II - Evidence that the driving force is a light-dependent sodium gradient. J. K. Lanyi (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.), R. Renthal (Texas, University, San Antonio, Tex.), and R. E. MacDonald (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.; Cornell University, Ithaca, N.Y.). *Biochemistry*, vol. 15, no. 8, 1976, p. 1603-1610. 43 refs.

A77-10705 * Monocarboxylic acids from oxidation of acyclic isoprenoid alkanes by Mycobacterium fortuitum. R. E. Cox (Liverpool, University, Liverpool, England), J. R. Maxwell, and R. N. Myers (Bristol, University, Bristol, England). *Lipids*, vol. 11, no. 1, 1976, p. 72-76. 11 refs. Grant No. NGL-05-003-003.

Mycobacterium fortuitum utilizes certain stereoisomeric mixtures of individual multimethyl branched alkanes as sole carbon source, including 2,6(R), 10(S), 14(RS)-tetramethylhexadecane; 2,6(R), 10(S), 14(RS)-tetramethylheptadecane; 2,6(RS), 10(RS)-trimethyltetradecane, and 2,6(R), 10(S)-trimethylpentadecane. Products of oxidation isolated from the bacterial lipids were acids derived predominantly from oxidation of the isopropyl terminus of each alkane, except in the case of 2,6(RS), 10(RS)-trimethyltetradecane. With the latter, acids from oxidation at either terminus were detected in comparable proportions. (Author)

A77-10709 * Cardiovascular and pulmonary dynamics by quantitative imaging. E. H. Wood (American Heart Association, New York, N.Y.). *Circulation Research*, vol. 38, Mar. 1976, p. 131-139. 41 refs. Research supported by the American Heart Association; Grants No. NIH-HI-4664; No. NIH-RR-7; No. NGR-24-003-001; Contract No. F44620-71-C-0069.

The accuracy and range of studies on cardiovascular and pulmonary functions can be greatly facilitated if the motions of the underlying organ systems throughout individual cycles can be directly visualized and readily measured with minimum or preferably no effect on these motions. Achievement of this objective requires development of techniques for quantitative noninvasive or minimally invasive dynamic and stop-action imaging of the organ systems. A review of advances in dynamic quantitative imaging of moving organs reveals that the revolutionary value of cross-sectional and three-dimensional images produced by various types of radiant energy such as X-rays and gamma rays, positrons, electrons, protons, light, and ultrasound for clinical diagnostic and biomedical research applications is just beginning to be realized. The fabrication of a clinically useful cross-section reconstruction device with sensing capabilities for both anatomical structural composition and chemical composition may be possible and awaits future development. S.D.

A77-10799 Effects of psychosocial stimuli on plasma renin activity in rats. D. M. Clamage, C. S. Sanford, A. J. Vander, and D. R. Mouw (Michigan, University, Ann Arbor, Mich.). *American Journal of Physiology*, vol. 231, Oct. 1976, p. 1290-1294. 33 refs. Research supported by the Michigan Heart Association.

Unanesthetized male albino rats (200-250 g) were subjected to the open-field (novel environment) procedure and to the presence of a hungry cat as psychosocial stimuli to study the variation of the plasma renin activity (PRA) in the blood of these animals after decapitation. It is found that a 30-min exposure to the cited psychosocial stimuli produced statistically significant increases in PRA in rats maintained on either a standard (1% NaCl) or sodium-free diet. Prior treatment with propranolol did not completely eliminate the PRA. It is concluded that psychosocial stimuli can significantly enhance renin secretion and that this response is mediated, at least in part, by the sympathetic nervous system. S.D.

A77-10800 Effects of chronic hypoxia and dietary restriction on myocardial enzyme activities. S. E. Barrie and P. Harris (London, University, London, England). *American Journal of Physiology*, vol. 231, Oct. 1976, p. 1308-1313. 17 refs. Research supported by the Nuffield Foundation.

Results are presented of an experimental study of the activities of a range of enzymes from different catabolic pathways and of cytoplasmic and mitochondrial origin in homogenates of left and right ventricles of guinea pigs after 14- and 28-day exposure to 400 mm Hg barometric pressure. Two control groups of animals were used, one free fed and the other restricted to the amount of food chosen by the hypobaric group. The left and right ventricles were considered separately so as to distinguish the effects of hypoxia from those of hypertrophy. All the animals developed anorexia and right ventricular hypertrophy. A major conclusion is that there are significant differences in a number of enzyme activities between the left and right ventricles. Dietary restriction is associated with a decrease in glycogen phosphorylase, hexokinase, and succinate dehydrogenase activity and an increase in the M-subunits of lactate dehydrogenase. Chronic hypoxia per se does not evoke an increase in M-subunits. S.D.

A77-10887 * # Joint inflight biomedical experiments performed during the ASTP spaceflight. G. R. Taylor (NASA, Johnson Space Center, Houston, Tex.), T. D. Rogers, M. E. Brower, and K. Kropp (Northrop Services, Inc., Houston, Tex.). *International*

Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-031. 9 p. 18 refs.

Two joint inflight biomedical experiments were conducted during the unique Apollo-Soyuz Test Project (ASTP) spaceflight. One experiment evaluated rhythmicity of spore production of Streptomyces levoris. The other evaluated components of the infectious disease process by measuring alteration in: (1) the composition of the microbial population inhabiting USA and USSR crewmembers and spacecraft; (2) the ability of each crewmember's defense mechanism to resist infection; and (3) the ability of certain microorganisms to originate infections. These two experiments are described and the major results discussed. (Author)

A77-10888 * # **Effect of hypovolemia, infusion, and oral rehydration on gradual onset +Gz acceleration tolerance.** J. E. Greenleaf, P. J. Brock, R. F. Haines, S. A. Rositano, L. D. Montgomery, and L. C. Keil (NASA, Ames Research Center, Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-039.* 9 p. 25 refs. Grant No. NCA2-OR180-506.

The purpose of this study was to determine the effect of blood withdrawal, blood infusion, and oral fluid intake on +Gz tolerance at an acceleration rate of 0.5 G/min. Six healthy men aged 21-27 yr were centrifuged after the withdrawal of 400 ml of blood (hypovolemia) from each man; they were centrifuged again following blood infusion (Phase I). Three weeks later the men were accelerated after similar hypovolemia and again after consuming 800 ml of an isotonic NaCl drink (Phase II). Phase I hypovolemia resulted in a reduction in tolerance in all subjects from a mean control level of 6.42 + or - 0.35 min to 5.45 + or - 0.17 min (-15.1%, p less than 0.05). Both infusion and drinking returned tolerances to control levels. During acceleration there were significant (p less than 0.05) increases in plasma vasopressin levels to 35 pg/ml; these were not influenced appreciably by infusion or drinking. In all acceleration runs there was an obligatory shift (loss) of plasma volume and electrolytes, especially potassium, regardless of the experimental treatments. Oral rehydration is shown to be as effective as blood replacement in restoring +Gz acceleration tolerance decrements due to hypovolemia. (Author)

A77-10889 # **A Space Shuttle galley system.** B. Cooper (Fairchild Republic Co., Farmingdale, N.Y.). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-044.* 4 p.

Problems, goals, constraints, and initial tasks in design and improvements of food logistics, food preparation, food acceptance, water and cooking systems, and trash management onboard Space Shuttle are discussed. Rehydratables, ready-to-eat (RTE) foods, beverages, and thermostabilized (canned) foods are discussed in regard to handling, calories and nutrient value, earthlike familiarity in appearance, consumer evaluation and complaints, stability, stowability, safety, and contribution to overall menu. Food and water system stowage space as needed per length of mission (assuming crew of seven), food logistics systems adaptability to later improvements, and selection of food oven (convection rather than conduction oven) are dealt with. R.D.V.

A77-10988 * **Analytical notes - Electrochemical method for early detection and monitoring of coliforms.** J. R. Wilkins (NASA, Langley Research Center, Hampton, Va.) and E. H. Boykin (Northrop Services, Inc., Hampton, Va.). *American Water Works Association, Journal,* vol. 68, May 1976. 7 p. 11 refs.

An electrochemical method for detecting bacteria, based on a linear relationship between inoculum size and the time of hydrogen evolution, was tested for the early detection and monitoring of coliforms in naturally contaminated estuarine and fresh water samples. Standard methods for coliform analysis were performed on each sample, and membrane filtration counts were used to construct dose-response curves; relationships and results are discussed herein. (Author)

A77-10990 * **The diurnal variation of neutral hepatic fructose 1,6-diphosphatase in partially inbred populations of rats and in outbred populations of Microtus montanus.** P. U. Ashman, S. L. Lampkin, K. G. Boutté, L. A. Dillon, and K. R. Williams (Louisiana, Xavier University, New Orleans, La.). *Comparative Biochemistry and Physiology,* vol. 53B, 1976, p. 315-318. 14 refs. Grants No. NGR-19-007-004; No. NIH-RR-08008.

A77-10991 * **Average latitudinal variation in ultraviolet radiation at the earth's surface.** F. S. Johnson (Texas, University, Richardson, Tex.), T. Mo, and A. E. S. Green (Florida, University, Gainesville, Fla.). *Photochemistry and Photobiology,* vol. 23, 1976, p. 179-188. 17 refs. Research supported by the U.S. Department of Transportation; Grant No. NGL-44-004-026.

Tabulated values are presented for ultraviolet radiation at the earth's surface as a function of wavelength, latitude, and season, for clear sky and seasonally and latitudinally averaged ozone amounts. These tabulations can be combined with any biological sensitivity function in order to obtain the seasonal and latitudinal variation of the corresponding effective doses. The integrated dosages, based on the erythemal sensitivity curve and on the Robertson-Berger sunburn-meter sensitivity curve, have also been calculated, and these are found to vary with latitude and season in very nearly the same way as 307 and 314 nm radiation, respectively. (Author)

A77-11048 **Echocardiographic measurement of cardiac output using the mitral valve and aortic root echo.** A. V. Lalani (Alberta, University, Edmonton, Canada) and S. J. K. Lee (University Hospital, Edmonton, Canada). *Circulation,* vol. 54, Nov. 1976, p. 738-743. 23 refs.

A77-11049 * **The posterior aortic wall echocardiogram - Its relationship to left atrial volume change.** B. L. Strunk, J. W. Fitzgerald, M. Lipton, R. L. Popp, and W. H. Barry (Stanford University Hospital; U.S. Veterans Administration Hospital; Stanford University, Palo Alto, Calif.). *Circulation,* vol. 54, Nov. 1976, p. 744-750. 13 refs. Research supported by the Bay Area Research Council; Grants No. NIH-HL-14174; No. NIH-1-P01-HL-15833; No. NGL-05-020-305.

A77-11097 **Plasma angiotensin II levels in hypoxic and hypovolemic stress in unanesthetized rabbits.** R. M. Zakheim, A. Molteni, L. Mattioli, and M. Park (Kansas, University, Medical Center and Hospital, Kansas City, Kan.). *Journal of Applied Physiology,* vol. 41, Oct. 1976, p. 462-465. 24 refs. Research supported by the University of Kansas and Kansas Heart Association.

Plasma levels of angiotensin II were determined by radioimmunoassay in unanesthetized white rabbits exposed to acute hypoxia, chronic hypoxia, or hypovolemic stress. Angiotensin II levels significantly decreased after 10 min of acute hypoxia in normal rabbits and significantly increased when the same procedure was applied to animals previously exposed to hypoxia by 6-8 days of permanence in the hypobaric chamber or sodium deprivation. Chronic hypoxia resulted in a temporary increase of angiotensin II already evident on the 3rd day, but maximal at the 9th day with return to normal values within 16 days. Hypovolemic stress resulted in the expected rise of angiotensin II levels 10 min postbleeding both in normal and acclimatized rabbits. The response of the renin-angiotensin-aldosterone system to hypoxic and hypovolemic stress is different. The direction and magnitude of the response to hypoxia depends on the underlying state of activation of the system and the cardiovascular condition of the animal at the time of hypoxic stress. (Author)

A77-11098 Cyclic hypoxic pulmonary vasoconstriction induced by concomitant carbon dioxide changes. J. L. Benumof, J. M. Mathers, and E. A. Wahrenbrock (California, University, San Diego, Calif.). *Journal of Applied Physiology*, vol. 41, Oct. 1976, p. 466-469. 7 refs. Research supported by the American Heart Association; Grant No. PHS-HL-19169.

The stability of acute lobar hypoxic pulmonary vasoconstriction was examined. In 12 mongrel dogs the left lower lobe (LLL) was selectively ventilated with a constant minute volume with nitrogen and the electromagnetically measured fraction of the cardiac output perfusing the LLL and the LLL end-tidal CO2 concentration were observed for 1 h. It is found that both the fraction of the cardiac output perfusing the LLL and the LLL end-tidal CO2 concentration initially decreased during LLL hypoxia and then oscillated in a progressively damped fashion. When LLL end-tidal CO2 was kept constant by CO2 infusion during LLL hypoxia or when LLL hypoxia was induced by LLL atelectasis, no oscillations were observed. It is concluded that if minute ventilation of a hypoxic area of lung is kept constant, then decreased regional blood flow decreases regional alveolar P(CO2). Blood flow to an acutely hypoxic area will thus be oscillatory. (Author)

A77-11099 Anaerobic threshold and maximal aerobic power for three modes of exercise. J. A. Davis, P. Vodak, J. H. Wilmore, J. Vodak, and P. Kurtz (California, University, Davis, Calif.). *Journal of Applied Physiology*, vol. 41, Oct. 1976, p. 544-550. 20 refs. Contract No. F44620-72-C-0011.

Alterations in selected respiratory gas exchange parameters have been proposed as sensitive, noninvasive indices of the onset of metabolic acidosis (anaerobic threshold (AT)) during incremental exercise. The objectives were to investigate the validity and feasibility of AT detection using routine laboratory measures of gas exchange, i.e., nonlinear increases in minute ventilation and minute CO2 production and abrupt increases in fraction of oxygen in expired gas. The study examined the comparability of the AT and maximum oxygen consumption among three modes of exercise (arm cranking, leg cycling, and treadmill walk-running) with double determinations obtained from male subjects. No significant difference was found between the leg exercise modes (cycling and walk-running) for the AT while all pairwise arm versus leg comparisons were significantly different. Using additional subjects performing leg cycling tests, a significant correlation was found between gas exchange AT measurements and venous blood lactate AT measurements. The gas exchange AT is therefore a valid and valuable indirect method for the detection of the development of lactic acidosis during incremental exercise. (Author)

A77-11100 * Cerebellar pressor response in the dog. K. J. Dormer and H. L. Stone (Texas, University, Galveston, Tex.). *Journal of Applied Physiology*, vol. 41, Oct. 1976, p. 574-580. 25 refs. Grants No. NIH-HL-05145; No. NGR-44-088-002.

A fastigial pressor response has been elicited in the anesthetized mongrel dog. Stimulation within the rostral portions of this nucleus results in mean arterial pressure rises up to 150 mmHg above control. A proportional tachycardia is simultaneously evoked which may rapidly attain heart rates of 190 beats/min above control levels. Peak tachycardias immediately subside and often the heart rate declines below control values during stimulation while arterial pressure remains elevated. When either the carotid sinuses were isolated by ligation or a bilateral vagotomy was performed, the fastigial tachycardia was sustained. The response could still be attained when submaximal doses of alpha-chloralose anesthesia or high levels of barbiturates (30-40 mg/kg) were given. Both portions of the response result from widespread sympathetic activation; however, buffering of the response through the baroreceptor reflexes is only demonstrated in the cardiac segment of the response. (Author)

A77-11166 Simultaneous three-channel signal detection - Performance and criterion as a function of order of report. L. D. Pohlmann (USAF, Human Resources Laboratory, Williams AFB, Ariz.) and R. D. Sorkin (Purdue University, Lafayette, Ind.). *Perception and Psychophysics*, vol. 20, no. 3, Sept. 1976, p. 179-186. 34 refs. NSF-supported research.

Earlier studies have shown that observers can perform two-channel tasks with the same efficiency as single-channel tasks as long as no more than one signal or signal-like event is present. In this paper, results are presented for experiments conducted on three female students with normal hearing to evaluate performance on a task requiring detection of three simultaneous and independent sinusoidal signals and compare this performance to single-channel performance. The signals and noise were monaural, and all signals were 100 msec in duration and were presented simultaneously during a single visually-marked 100 msec observation interval. The data for each channel were analyzed conditional on the stimulus-response events occurring in the remaining channels and conditional on the order of report. It is found that the decrement in performance in any channel in the three-channel task increases with increasing number of signals and/or yes-responses present in the remaining channels. The data obtained lend support to a model comprising an independent-channel perceptual processor feeding into a cognitive processor susceptible to channel interactions. S.D.

A77-11309 # Calculating relaxation length from measurement data (A relaxacios hossz szamitasa mert adatokbol). E. Szondi (Budapesti Muszaki Egyetem, Budapest, Hungary). *Energia es Atomtechnika*, vol. 29, July 1976, p. 294-298. 7 refs. In Hungarian.

The article deals with ways of processing measurement results on biological shielding materials for research reactors and training reactors. Emphasis is placed on regression analysis applied to calculation of relaxation lengths and buildup factors. Several empirical formulas for buildup factors are presented and discussed. Clean geometry and collimation arrangements (for source/test material/detector geometries) are described and compared. A flexible polyhedron algorithm for multivariate functions (with polyhedron collapsing to a point) developed in Hungary (Ugray, 1974) for regression calculations is recommended, along with a program included in the HP-65 or HP-67 programmable pocket calculator library. Data needed for running a macrocomputer program (ALGOL-60 RAZDAN language) on the problem are indicated. R.D.V.

A77-11351 # Eye movements occurring during head turns aboard artificial gravity stations (Dvizheniia glaz, voznikaiushchie pri povorotakh golovy na stantsiiakh iskusstvennoi sily tiazhesti). I. Iu. Sarkisov and A. A. Shipov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 3-8. 14 refs. In Russian.

Theoretical concepts previously advanced by the authors are used to predict the direction and pattern of eye movements induced by stimulation of the receptors of the semicircular canals during head turns aboard an artificial gravity station. The results obtained are necessary for determining the expected disorientation illusions of vestibular origin as well as the vestibular effects on the functions of visual tracking and fixation when staying aboard an artificial gravity station. It is shown that the pattern of eye movements depends essentially on the initial orientation of man in space. S.D.

A77-11352 # Evaluation of the effect of impact accelerations on the organism from laboratory data (Otsenka deistviia udarnykh peregruzok na organizm po dannym laboratornykh issledovanii). E. E. Simonov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 8-14. 22 refs. In Russian.

Experiments were conducted on 8 volunteer human subjects aged 20-22 yr and on 225 male white rats weighing 150-300 g to study the variations of more than 20 clinico-laboratory parameters

during exposures to impact accelerations of landing. The result obtained point to a positive correlation between changes in the general condition of the animals and the morphological picture of the internal organs, as well as between changes in certain hematological and biochemical indices of blood. A scheme of employing most informative parameters is proposed for in vivo differentiation of the effects of impact accelerations. Experimental results on human subjects indicate that measurements of endogenous creatinine excretion from the urine hold promise in this respect. S.D.

A77-11353 # **Effect of accelerations, additional weight stress, and hypokinesia on protein metabolism in the Japanese quail /Coturnix coturnix japonica/. I - Effect on muscle composition (Vliianie uskorenii, dopolnitel'noi vesovoi nagruzki i gipokinezii na metabolizm belkov u perepela laponskogo /Coturnix coturnix japonica/. I - Vliianie na sostav myshts).** M. Gazho, M. Stanislavova, V. Sabo, K. Bodia, E. Ginter, and M. Iurani. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 14-19. 17 refs. In Russian.

Experiments were carried out on 4 groups of quails (Coturnix coturnix japonica) aged 12 months to study the effect of hypokinesia, centrifugation-induced hypergravity and additional weight stress on the content and composition of proteins and nucleic acids in the muscles of the chest and the pelvic limb. The 1st group was the control, the 2nd included hypokinetic birds, the 3rd group consisted of birds with additional weight stress, and the 4th group contained birds exposed to an acceleration of 3 g. The variables measured were content of total proteins, sarcoplasmic proteins, DNA and RNA, cholesterol and esterified fatty acids in chest and pelvic muscles. Corticosterone level was measured in the blood plasma. The results suggest that increased gravity has a specific effect on the composition of muscular tissues, which cannot be attributed either to mechanical (weight) stress or to hypokinesia. S.D.

A77-11354 # **Effect of a strong constant magnetic field and a hypomagnetic environment on the histochemical indices of the liver in white rats (Vliianie sil'nogo postoiannogo magnitnogo polia i gipomagnitnoi okruzhaiushchei sredy na gistokhimicheskie pokazateli pecheni belykh krys).** I. V. Shust and I. M. Kostinik. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 19-25. 16 refs. In Russian.

A77-11355 # **Investigation of the physiological activity of Chlorella vulgaris following an exposure to space flight factors aboard the Salyut orbital station (Issledovanie fiziologicheskoi aktivnosti khlorelly posle vozdeistviia faktorov kosmicheskogo poleta na bortu orbital'noi stantsii 'Saliut').** T. B. Galkina and G. I. Meleshko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 25-30. 5 refs. In Russian.

A77-11356 # **Control of mineral nutrition of higher plants in biological life support systems (Upravlenie mineral'nym pitaniem vysshikh rastenii v biologicheskikh sistemakh zhizneobespecheniia).** V. I. Rozhdestvenskii, M. V. Vil'iams, I. V. Tsvetkova, E. V. Lebedeva, T. P. Alekhina, G. G. Rusakova, and V. M. Simonov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 30-35. In Russian.

Results are presented regarding the development and experimental study of a program for controlling the mineral nutrition of higher plants for use in biological life support systems. The control method is based on the correlative relationship between consumption of mineral elements and increase of biomass. Experiments on carrots grown aeroponically indicate that mineral nutrition of plants can be controlled by means of a corrective nutrient solution applied according to the protocols obtained from studies on increase in the dry biomass of the plant. S.D.

A77-11357 # **Model of an ecological system closed relative to gas exchange with a periodically operating autotrophic unit. II - Stability of periodic cycles (Model' zamknutoi po gazoobmenu ekosistemy s periodicheski rabotaiushchim avtotrofnym zvenom. II - Ustoichivost' periodicheskikh rezhimov).** V. G. Shabel'nikov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 36-40. In Russian.

Available experimental data on the influence of atmospheric composition on the photosynthetic productivity of an intensive microalgal culture are used to construct a mathematical model of an ecological system that is closed with respect to gas exchange and operates in alternating light-dark cycles. The study determined the type of the periodic time dependence of the steady-state atmosphere of the ecological system. Conditions for the existence and stability of the steady-state atmosphere are identified. S.D.

A77-11358 # **Human tolerance to +Gz accelerations during heating of the body (Perenosimost' chelovekom uskorenii napravleniia +Gz v usloviiakh peregrevaniia organizma).** A. R. Kotovskaia, R. A. Vartbaronov, and V. M. Khrolenko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 41-45. 11 refs. In Russian.

Experiments were conducted on 25 healthy male subjects subjected to centrifugal accelerations to study their tolerance to acceleration under varying body temperatures. A regression analysis of the data indicates that at a body temperature of 37.3 C a reduction in +Gz acceleration tolerance is expected in some of the subjects, but at 37.6 C and more the reduction occurs in most of the subjects. The results obtained allow practical recommendations to be made relative to acrobatic flights in a hot climate. S.D.

A77-11359 # **Effect of positive longitudinal acceleration on the transmission properties of a human operator (O vliianii polozhitel'noi prodol'noi peregruzki na peredatochnye svoistva cheloveka-operatora).** V. A. Bodner and V. K. Filosofov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 45-48. In Russian.

Results are presented for an experimental study of the effect of +Gz accelerations on the transmission properties of a human operator involved in the closed loop of a tracking system. The quality of tracking a complex signal upon exposure to accelerations of different magnitudes is assessed. The result of increased acceleration and time exposure is that the distribution of tracking errors of the human operator deviates from a bell-shaped and approaches a uniform distribution. Accelerations aftereffects disappear in about 2 min. S.D.

A77-11360 # **Cognitive activity of man during adaptation to short-term weightlessness (Poznavatel'naia deiatel'nost' lichnosti pri adaptatsii k kratkovremennoi nevesomosti).** O. N. Kuznetsov, I. A. Kolosov, A. V. Kaliberdin, and A. A. Prusskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 9, Nov.-Dec. 1975, p. 48-54. 27 refs. In Russian.

Psychological methodology of personality assessment is used to study differences in individual experiences of human subjects exposed to short-term weightlessness for the first time. It is found that subjects of the objective-productive type of cognitive behavior exhibit the most rapid and adequate adaptation to weightlessness. Individuals of the subjective and nonproductive types of cognitive activity showed great difficulties in adapting to weightlessness, marked by abnormal psychic states such as the 'world peril' syndrome and psychic alienation. Anticipation of weightlessness on the basis of previous objective information is shown to facilitate orientation and self-control of man under weightlessness conditions. S.D.

A77-11361 # Adaptation of the cardiovascular system to negative stressful acceleration during repeated antiorthostatic exposures (Adaptatsiia serdechno-sosudistoi sistemy k otritsatel'noi gravitatsionnoi nagruzke pri povtornykh antiortostaticheskikh vozdeistviiakh). D. A. Alekseev, Kh. Kh. Iarullin, and T. D. Vasil'eva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 55-61. 25 refs. In Russian.

A77-11362 # Functional interdependence of the visual and auditory analyzers during extremal stimulation (Vzaimozavisimost' funktsii zritel'nogo i slukhovogo analizatorov pri ekstremal'noi stimuliatsii). I. F. D'iakonov and A. S. Mozzhukhin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 61-65. In Russian.

Psychophysiological methods are used in an experimental study on 10 male subjects aged 19-22 yr to evaluate the effect of intense photostimulation on the functional state of the visual analyzer, along with the effect of an extremal light stimulus on the hearing function. It is shown that a pulsed acoustic stimulus promotes the recovery of peripheral photosensitivity, does not affect central photosensitivity, improves the acuity of color differentiation, enlarges the field of vision for red and green, and reduces the electrical sensitivity of the eye and critical frequency for the vanishing of light flashes. Exposure to a superluminous flash is found to reduce the absolute hearing thresholds, the electrical sensitivity of the eye, and the critical frequency for the fusion of the electric stimuli of the auditory system. The results point to the possibility of increasing the sensitivity of an analyzer through a short-term intense stimulation of another analyzer. S.D.

A77-11363 # Study of the dynamics of mental working capacity in flight personnel with hypertensive disease for prognosis of their occupational activity (Izuchenie dinamiki psikhicheskoi rabotosposobnosti letnogo sostava pri gipertonicheskoi bolezni v tseliakh prognozirovaniia professional'noi deiatel'nosti). K. K. Ioseliani. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 65-70. 8 refs. In Russian.

A77-11364 # Working capacity of man during stay at high altitudes (Rabotosposobnost' cheloveka vo vremia prebyvaniia v gorakh). M. T. Turkmenov and D. I. Imankulov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 70-75. 32 refs. In Russian.

Experiments were conducted on 11 lowland male subjects aged 18-24 yr who have ascended to an altitude of 3200 m without preliminary training. The objectives were to determine when maximal working capacity is normalized at high altitudes and to assess the extent to which this capacity can be increased when subjects experience additional physical stress. During their stay at high altitude, the subjects were involved in daily gymnastic and sports activities, and they periodically and gradually climbed to further heights up to 4000 m; such an adaptive regime was called 'pulsating' mode of adaptation. The phasal variation of maximal working capacity during a short-term stay at high altitude was such that in the first 10 days of stay the working capacity was reduced by 12-13%, but on the 41st-42nd day it increased by 25%. The working capacity during a readaptation period is found to persist for 2 months at a level of 25-30% higher than the initial level. The suitability of the 'pulsating' mode of adaptation for enhancing physical working capacity of the human organism is thus demonstrated. S.D.

A77-11365 # Investigation of the composition of volatile compounds in sweat and urine in man (Issledovanie sostava letuchikh soedinenii pota i mochi u cheloveka). V. P. Savina, N. L. Sokolov, and E. A. Ivanov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 76-78. 9 refs. In Russian.

A procedure based on gas chromatography is outlined for qualitative analysis of the volatile compounds in the urine and sweat released by individuals placed in a hermetic chamber. Harmful metabolites liberated in sweat and urine are identified. The result of lack of purification of the environment in the hermetic chamber is that in the case of low perspiration of about 500 ml/day the amount of released volatile metabolites is enough to contaminate the environment for a chamber space of less than 3 cu m per person. The results obtained may be used in formulating means for purification of the environment of manned hermetic chambers from toxic and foul-smelling substances. S.D.

A77-11366 # Radioprotective effect of mexamin and cystamin on animals exposed to hypokinesia and ionizing radiation (Radiozashchitnyi effekt meksamina i tsistamina na organizm zhivotnykh pri gipokinezii i ioniziruiushchei radiatsii). L. Ia. Kolemeeva, V. S. Shashkov, and B. B. Egorov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 78, 79. In Russian.

A77-11367 # Hypokinesia and macroscopic changes in seminal vesicles (Gipokineziia i makrometricheskie izmeneniia semennykh puzyrkov). L. P. Smol'skii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 9, Nov.-Dec. 1975, p. 79-82. 5 refs. In Russian.

A77-11368 # Pathophysiology of long-term hypokinesia (Patofiziologiia dlitel'noi gipokinezii). E. A. Kovalenko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Jan.-Feb. 1976, p. 3-15. 77 refs. In Russian.

The article reviews the literature on effects of long-term immobilization (periods of 10 days up to 70 days or beyond) on animal and human organisms. Effects on tissue respiration, enzyme activity, metabolic rate, hormonal function (glycolysis, AMP/ADP/ATP balance, phosphodiesterase activity), lack of periodic stimuli for DNA to RNA to protein synthesis, lowered uptake of radiotagged amino acids in mouse muscle protein, body weight loss, retarded growth in juveniles, weakening of efferent impulsation and afferent feedback, effect on cardiovascular system and hemodynamics, on lower half of body, water/salt metabolism, immunological responses, EEG, sleep, irritability level, endocrinal and nervous function, bone tissue, teeth, and hemopoiesis. Compensatory mechanisms and compensatory effects of horizontal position are considered, and a pathogenesis flowchart is included. R.D.V.

A77-11369 # The Soyuz-Apollo experimental flight - Preliminary results of medico-biological research carried out during flight of Soyuz-19 (Eksperimental'nyi polet 'Soiuz-Apollou' - Predvaritel'nye rezul'taty mediko-biologicheskikh issledovanii, vypolnennykh vo vremia poleta korablia 'Soiuz-19'). E. I. Vorob'ev, O. G. Gazenko, N. N. Gurovskii, Iu. G. Nefedov, B. B. Egorov, I. I. Spitza, E. N. Biriukov, I. I. Brianov, A. V. Eremin, and A. D. Egorov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Jan.-Feb. 1976, p. 15-22. In Russian.

Preliminary results of microbiological and physiological tests are reported for pre-flight, in-flight, and post-flight programs. Fungus and microbial experiments carried out jointly by the two crews are listed. Information is provided on the daily physiological and pharmaceutical regimes of the cosmonauts, ECG data, pressure discrepancies between the two spacecraft quarters, dumping of pressure on Soyuz-19 for equalization, and absence of anticipated decompression disturbances. Post-flight ophthalmological, g-load, blood chemistry, blood count, weight change, urine analysis and other physiological tests are reported. Slight reversible shifts in metabolic function are reported, and the value of pre-flight conditioning and training exercises for minimizing in-flight discomfort is confirmed. R.D.V.

A77-11370 # **Study of phosphatase activity in the bone tissue and blood serum during 90-day hypokinesia (Izuchenie aktivnosti fosfataz v kostnoi tkani i syvorotke krovi pri 90-sutochnoi gipokinezii).** A. Menendes, R. A. Zavalishina, and A. A. Pokrovskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 22-26. 18 refs. In Russian.

Experiments were conducted in which the activity of alkaline and acid phosphatases in the femoral epiphysis and diaphysis and the activity of alkaline phosphatase of Wistar rats that were subjected to 90-day hypokinesia were studied. At the beginning of the hypokinesia experiment, the activity of both enzymes decreased, the decrease of alkaline phosphatase being more significant. After a period of stress, the activity of both enzymes was seen to increase, especially that of acid phosphatase in the diaphysis. B.J.

A77-11371 # **The effect of different regimes of motor activity on the adaptation of man to high altitude (Vliianie razlichnykh rezhimov dvigatel'noi aktivnosti na protsessy adaptatsii cheloveka k usloviiam vysokogor'ia).** V. I. Korol'kov, M. M. Mirrakhimov, A. D. Dzhailobaev, O. N. Narbekov, N. Ia. Iusupova, and V. V. Verigo. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 26-31. 19 refs. In Russian.

A77-11372 # **The effect of impact accelerations on the heart and hemodynamics of rats (Deistvie udarnykh peregruzok na serdtse i gemodinamiku krys).** V. I. Gorlachev and A. N. Vizgalin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 31-35. 10 refs. In Russian.

Drugged white rats were subjected to impact accelerations by dropping weights on their chest region; the accelerations thus acting in a spineward direction, at a speed of 3 m/s. The following measurements were made: ECG, blood pressure, blood volume, blood minute volume and electrolyte content in the blood plasma. It was shown that impact on the cardiac area induced bradycardia, arrhythmia, ectopic beats, and atrio-ventricular blockage followed by a drop in arterial pressure and a rise in venous pressure, and a decrease of cardiac output and blood volume. The breakage of myocardial fibers was also noted. B.J.

A77-11373 # **The effect of centrifugal force on the neck nystagmus of pigeons (Vliianie tsentrobezhnoi sily na sheinyi nistagm u golubei).** V. A. Kisliakov and L. A. Semenov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 35-40. 9 refs. In Russian.

The paper reports on a quantitative investigation of the changes of the parameters of the nystagmus with respect to time and the modification of these parameters under the effect of otolith stimulation (centrifugal force). Pigeons were subjected to angular accelerations (positive and negative) which primarily affected the semicircular canals, to stimulation of the otolith organs by centrifugal force, and to angular acceleration of the labyrinth receptors. Electromyography of the neck muscles was performed in conjunction with the accelerations. The centrifugal force is shown to have a dynamic effect on the nystagmus: the modifications of the parameters (latent period, frequency, time of minimum and maximum of frequency) of the nystagmus reveal phases of relaxed and severe response which depend, apparently, on the correlation of peripheral and central nervous processes, evoked simultaneously by the excitation of receptors of the semicircular canals and the vestibule. B.J.

A77-11374 # **Dynamics of the motor components of the optokinetic nystagmus during exposure of the vestibular apparatus to angular accelerations (Dinamika motornykh komponentov optokineticheskogo nistagma pri deistvii na vestibuliarnyi apparat uglovykh uskorenii).** V. I. Babiiak. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 40-45. 10 refs. In Russian.

A77-11375 # **State of the labyrinth tonic reflexes of position during the administration of trace elements to rabbits /copper, manganese, and cobalt/ (Sostoianie labirintnykh tonicheskikh refleksov polozheniia pri vvedenii krolikam mikroelementov /medi, margantsa i kobal'ta/).** V. S. Raitses and S. P. Voroshilovskaia. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 45-50. 12 refs. In Russian.

A77-11376 # **Effect of transverse accelerations on the motor function of the stomach (Vliianie poperechno-napravlennykh uskorenii na motornuiu funktsiiu zheludka).** V. V. Murashko and K. V. Smirnov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 50-54. 10 refs. In Russian.

Experiments were conducted to investigate the effect of transverse accelerations on the motor functions in hungry and fed states of the stomachs of men and dogs. Electrogastrography was performed on the human subjects to determine the average hourly value of the amplitude and frequency of hungry contractions. Accelerations were found to cause inhibition of the motor function of the stomach and alteration of the periodicity pattern. The changes in the motor function appear to be secondary and to be associated with the changes in the functional state of the regulatory centers of motor activity. B.J.

A77-11377 # **The time of adaptation of flying personnel to subtropical climates (O srokakh adaptatsii letno-tekhnicheskogo sostava k rabote v usloviiakh subtropicheskogo klimata).** P. G. Kozacha and I. R. Grishin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 54-56. In Russian.

Sixty-eight flight crew members in the age range 24-50, arriving from the midlatitudes to the subtropics, were examined as to how long it took them to adapt to the subtropical climate. The factors which served as an indication of acclimatization were sleep, appetite, mood, general state, heart rate, and arterial pressure. It was found that acclimatization takes 2-4 weeks depending on the season. The best season for adaptation is found to be spring-summer, when adaptation time is twice as short as in winter. B.J.

A77-11378 # **Characteristics of the morphological responses of the viscera and endocrine glands of dogs subjected to gamma irradiation for 6 years (Osobennosti morfologicheskikh reaktsii vnutrennikh organov i endokrinnykh zhelez sobak pri 6-letnem gamma-obluchenii).** E. A. Savina, V. I. Iakovleva, G. I. Plakhuta-Plakutina, and A. S. Pankova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 57-61. 10 refs. In Russian.

A77-11379 # **The effect of the chronic action of small dosages of ionizing radiation on the excretion of gaseous metabolites among white rats (Vliianie khronicheskogo deistviia malykh doz ioniziruiushchei radiatsii na vydelenie gazoobraznykh produktov metabolizma u belykh krys).** L. A. Tiunov, T. S. Kolosova, D. T. Lazurenko, and R. S. Apukhtina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 61-66. 19 refs. In Russian.

A77-11380 # **Development of reticulocytosis in the peripheral blood during exposure to a constant magnetic field (O razvitii retikulotsitoza v perifericheskoi krovi pri vozdeistvii postoiannogo magnitnogo polia).** A. G. Borodkina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 66-70. 10 refs. In Russian.

Experiments were conducted to determine the effect of a constant magnetic field with a strength of 1000 O on the

composition of the peripheral blood of test animals. After exposure to the magnetic field, measurements were made of erythrocyte and reticulocyte content and hemoglobin level. It was found that reticulocytosis develops, while the hemoglobin level and the erythrocyte count remains the same. Continuous exposure to a constant magnetic field has provided evidence that animals can adapt to the effects of the magnetic field. B.J.

A77-11381 # **The effects of hyperoxia and hypokinesia on the formation and excretion of gaseous metabolites among rats (Vliianie giperoksii i gipokinezii na obrazovanie i vydelenie gazoobraznykh produktov zhiznedeiatel'nosti u krys).** V. V. Kustov, B. I. Abidin, V. I. Belkin, and T. A. Lekareva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 70-73. 12 refs. In Russian.

A77-11382 # **A sorption method for the reclamation of water for the personal hygiene of cosmonauts (Sorbtsionnyi sbosob regeneratsii vody dlia lichnoi gigieny kosmonavtov).** V. B. Gaidadymov, A. G. Prishchep, K. V. Zarubina, L. E. Balashova, and S. P. Tsareva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 73-75. In Russian.

The paper describes a sorption method for the reclamation of water to be used for the washing of face, hands, and bodies of cosmonauts in space. Special attention is given to the selection and testing of a cleansing agent with bactericidal properties. The agent chosen is Catamine-AB (alkyddimethylbenzylammonium chloride) and tests were performed on the agent to study its cleansing properties and its effect on microorganisms. The sorption method was developed on the basis of a study of the sorption of Catamine-AB by a number of ion exchange resins and activated charcoals. B.J.

A77-11383 # **An attempt to disrupt the diurnal periodicity of the excretion of potassium in the urine (Popytka 'rasshatyvaniia' sutochnoi periodiki ekskretsii kaliia s mochoi).** S. I. Stepanova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 76-86. 5 refs. In Russian.

Two men were isolated and subjected to 72 hours of continuous wakefulness in order to disrupt the circadian sleep-wakefulness cycle. The aim of the experiment was to examine the feasibility of producing preliminary disruptions in the biorhythm which would prepare for adaptation to those experienced in space flight. The index of disruption was to be the diurnal rhythm of excretion of potassium in the urine. It was found that continuous wakefulness does not disrupt the diurnal periodicity of potassium excretion. B.J.

A77-11384 # **Determination of the adhesion properties of foodstuffs (Opredelenie adgezionnykh svoistv produktov pitaniia).** E. M. Rybalova and V. P. Babarin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 86-88. In Russian.

The paper discusses a way to eat rehydrated foodstuffs in space flight (weightless) conditions which allows one to use table utensils. The method consists of using rehydrated foodstuffs with good properties of adhesion to the metal surfaces of the utensils. An adhesiometer was used to measure the adhesion strength of a number of rehydrated foods which could be feasible for space consumption: cottage cheese with nuts, cottage cheese with black currant puree, cottage cheese pudding, mashed potatoes, mashed potatoes with starch added, goulash, and chicken puree soup. B.J.

A77-11385 # **Electrospectroscopic method for evaluating the interaction of radiation with DNA molecules (Elektrospektroskopicheskii metod otzenki vzaimodeistviia izlucheniia s molekulami DNK).** E. A. Shakunova, A. D. Chesnokov, and V. D. Chesnokova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Jan.-Feb. 1976, p. 89-91. 7 refs. In Russian.

The paper develops a quantum mechanical model for the interaction of radiation with DNA molecules assumed to have an energy band structure, and uses this model to construct an electrospectroscopic technique for investigating these interactions. The frequency dependence of permittivity in the low frequency range gives information about the polarization of the double layer of DNA molecules in a solution. The appearance of additional potential on the surface of a molecule under the action of radiation quanta leads to a change in the parameters of low frequency permittivity. Electrons which are excited by radiation quanta to higher energy levels, diffuse away from the irradiated surface into the layer, where they tunnel through the forbidden energy band of guanine and end up at the corresponding free energy levels of cytosine or adenine. B.J.

A77-11386 # **Current trends in biophysical studies of the vestibular function (Sovremennye napravleniia biofizicheskikh issledovanii vestibuliarnoi funktsii).** A. A. Shipov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Mar.-Apr. 1976, p. 8-16. 122 refs. In Russian.

Progress in the application of biophysical methods to experimental and theoretical investigations of the vestibular function over the past ten years is reviewed. Three major trends are analyzed. The first trend originates from Steinhauzen's discovery of elastic cupulae in the semicircular canals of the labyrinth and his hypothesis, where the cupulo-endolymphatic system is considered as a supercritically damped torsional pendulum which can be described by a second order differential equation; subsequent studies determined the range of applicability of the Steinhauzen's model. The second trend concentrates on particularities of stimuli of the vestibular system under natural conditions and in various moving systems. Particular attention is given to the influence of Coriolis forces on the endolymph of the semicircular canal in rotating systems (e.g., space vehicles). The objective of the third trend is to describe the cooperation of the vestibular and oculomotor systems in stabilization of visual fixation. Methods of the automatic control theory and the finite automaton approach are used to develop logico-mathematical models of these functions. Recommendations are presented for future research work along these lines. S.N.

A77-11387 # **State of osseous tissue under conditions of hypokinesia and weightlessness, and the effect of thyrocalcitonin (Sostoianie kostnoi tkani v usloviiakh gipokinezii i nevesomosti i deistvie tirokal'tsitonina).** A. I. Briskin, A. I. Volozhin, and V. S. Shashkov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Mar.-Apr. 1976, p. 17-22. 85 refs. In Russian.

Extreme conditions of a space flight cause significant changes in the mineral salt metabolism of skeletal bones. In particular, a reduction in the optical density of heel bone and spotted bone radiographs was observed in some astronauts. It was shown that the effect of a long-time hypokinesia, connected with bed rest, motor paralysis, or application of plaster bandages to the inferior limbs, is similar to that of weightlessness. Experimental studies on mineral metabolism disorders in bones during hypokinesia carried out over the last years are reviewed, with special attention to the role of thyroid gland hormones. Experiments on animals revealed an antiresorptive effect of thyrocalcitonine (TCT), a preparation obtained from cattle thyroid gland, and its normalizing influence on Ca-metabolism in bones and water-salt metabolism during immobilization and hypokinesia. Research on the influence of TCT on man is to be done before using it for prophylaxis of metabolism disorders in bone tissues during hypokinesia. S.N.

A77-11388 # **State of vascular regulation and regional hemodynamics in Soyuz-12 and Soyuz-13 crewmembers before and after flight (Sostoianie sosudistoi reguliatsii i regionarnoi gemodinamiki u chlenov ekipazhei 'Soiuz-12' i 'Soiuz-13' do i posle poleta).** Kh. Kh. Iarullin, T. D. Vasil'eva, T. N. Krupina, D. A. Alekseev, and V. F. Turchaninova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Mar.-Apr. 1976, p. 22-30. 12 refs. In Russian.

Postflight rheographic examinations carried out at rest and during postural tests showed pronounced changes in the vascular

regulation and significant blood redistribution and vascular tone after flight. On the landing day there were no signs of intracranical venous congestion during the antiorthostatic test. This indicated a stable adaptation of cerebral circulation to weightlessness. The tone of cerebral vessels, however, increased to prevent the development of cerebral venous congestion during the antiorthostatic test. This may be a result of weightlessness adaptation. The cerebral hemodynamic responses were more pronounced in the crewmembers who made an 8-day flight than in those who made a two-day flight, i.e., in the cosmonauts who returned to earth after weightlessness adaptation.
(Author)

A77-11389 # **Possible ways of solving the problem of 'biological compatibility' of crew members in long term space flights (O probleme 'biologicheskoi sovmestimosti' chlenov ekipazhei v dlitel'no deistvuiushchikh kosmicheskikh ob'ektakh i vozmozhnykh putiakh ee resheniia).** Iu. G. Nefedov, S. N. Zaloguev, and V. P. Savina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 30-34. 21 refs. In Russian.

The notion of 'biological compatibility' involves a beneficial or adverse mutual influence of one individual on another as a result of release of trace amounts of chemicals and microorganisms into the environment. Concentration of various chemical substances in expired air and the chemical composition of the latter was found to vary over a wide range from one individual to another, as well as chemical composition of sweat and volatile components released from the skin surface. Response of the organism to the environment generated by another individual ('stranger') during his long-term stay in a hermetic chamber is discussed. It is assumed that the biological compatibility is based on individual differences in intensity and characteristics of biochemical processes. The role and possible mechanisms of exchange of microorganisms are considered, along with the possibility of 'adoption' of another's microorganisms. Experimental data suggest that man's microflore is specifically individual and that such an adoption is difficult and can be only relative. Major trends of future research are outlined. S.N.

A77-11390 # **Conditioning of water regenerated from water-containing wastes (Konditsionirovanie vody, regenerirovannoi iz vlagosoderzhashchikh otkhodov).** T. I. Luzina, N. A. Golikova, and M. I. Shikina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 35-37. 5 refs. In Russian.

The problem of conditioning of water regenerated from wastes to obtain adequate potable water for space crews involves its enrichment in salts and its disinfection. Extensive experiments on a large variety of natural minerals containing necessary macroelements and microelements were carried out to study the characteristics of water filtered through a layer of these minerals. A composite filter consisting of silver-coated dolomite and fluorite granules for simultaneous mineralization and disinfection of regenerated water is proposed. Results of hygienic tests of water conditioned by using this filter are presented showing that the water is of full biological value. S.N.

A77-11391 # **A model of the physiological thermoregulation system (Model' fiziologicheskoi sistemy termoreguliatsii).** Iu. A. Rostopshin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 37-41. 10 refs. In Russian.

A mathematical model of an isolated physiological thermoregulation system allowing for self-oscillations of the body temperature in homoiothermal animals is developed. The conceptual basis of the model is connected with the notions of homeokinesis and noncontractile thermogenesis. The rate of the ATP synthesis is assumed to control the heat production process. An analysis of the obtained solutions reveals the existence of two steady-state regimes: a state of rest and a self-oscillation regime. The period of self-oscillations is supposed to be fully determined by the parameters of the heat emission system, while the amplitude of the phase variable depends only on biochemical processes. S.N.

A77-11392 # **Study of in-flight working capability of pilots during simulated motion sickness (Issledovanie letnoi rabotospособnosti pilotov pri modelirovanii bolezni dvizheniia).** N. A. Razsolov and O. P. Iakovlev. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 41-45. 13 refs. In Russian.

Using a modified procedure of taking cockpit instrument readings (color slides of the AN-24 aircraft instrument panel), the working capability of pilots was quantitatively studied under conditions of simulated bumpiness. A point scale was developed to assess the results of the reading. The minimum exposure for successful reading was found to be 4 sec for experienced pilots. After five double rotation procedures statokinetically stable pilots developed a latent form of motion sickness which manifested itself in decreased professional performance, while statokinetically unstable pilots showed pronounced symptoms of motion sickness in overt form. The method can be used for medical examination of pilots' in-flight reliability. S.N.

A77-11393 # **Influence of hyperoxia on the characteristics of external respiration, cardiovascular system, and gas composition of blood (Vliianie giperoksii na pokazateli vneshnego dykhaniia, serdechno-sosudistoi sistemy i gazovyi sostav krovi).** O. V. Korkushko and L. A. Ivanov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 45-50. 20 refs. In Russian.

A77-11394 # **Evaluation of the rate of acoustic reception of radiotelegraph signals in psychological selection of candidates for pilot training (Ob issledovanii skorosti priema radiotelegrafnykh signalov na slukh v protsesse psikhologicheskogo otbora kandidatov dlia letnogo obucheniia).** D. I. Shpachenko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 54-58. 6 refs. In Russian.

A77-11395 # **Results of exposure of mammalian cell cultures aboard an earth satellite (Rezul'taty eksponirovaniia kul'tury kletok mlekopitaiushchikh na iskusstvennom sputnike zemli).** F. V. Sushkov, V. V. Portugalov, S. V. Rudneva, N. N. Bobkova, E. K. Iordanishvili, and E. A. Izupak. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 58-63. 17 refs. In Russian.

The paper presents the results of an exposure of cells of the Syrian hamster strain VNK-21 to space flight effects. In contrast to the cell culture kept in a thermostat at 29 C, the cell culture that was maintained in thermally uncontrolled conditions developed noticeable structural and physiological changes induced by suboptimal temperatures. It is concluded that a 6-day exposure to weightlessness has no pernicious effect on mammalian cells in vitro and produced no stable structural or physiological changes. Some changes detected in the cell culture - faster aging during flight, stable tendency to increased number of cells with enlarged nuclei, an increase in the mitotic index at an early stage of cultivation - need further verification.
(Author)

A77-11396 # **The effect of a long-time influence of a constant and alternating 1000-oersted magnetic field on mitotic activity (O vliianii dlitel'nogo vozdeistviia postoiannogo i znakoperemennogo magnitnogo polia 1000 e na mitoticheskuiu aktivnost').** A. D. Strzhizhovskii and G. V. Galaktionova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 63-67. 6 refs. In Russian.

Application of magnetic protection against ionizing radiation in long-term space flights will expose astronauts to the influence of low-gradient constant magnetic fields. In order to assess their effect on the health and working capability, experiments on mice were carried out, in which the animals were exposed for 15 days to the influence of a 1000-oersted magnetic field of constant and changing direction. The epithelium of the cornea and the bone marrow of the tested animals were subjected to a cytogenetic analysis. No major disorder was observed. An initial decrease in the mitotic index of the corneal epithelium and bone marrow was subsequently compensated

by adaptive mechanisms. The developing mitotic hyperactivity results in an increased resistivity of tissues to some adverse factors (e.g., ionizing radiation). The amount of cells in the tissues decreased insignificantly and rapidly returned to the normal value after switching off the field. Changes in the field direction with respect to the position of the animal's body caused no additional reduction in mitotic activity; however, the efficiency of the adaptive processes drastically decreased. S.N.

A77-11397 # **Response of the fibroblasts of granulation tissue in regenerating skin to chronical hypoxia (Reaktsiia fibroblastov granuliatsionnoi tkani regeneriruiushchei kozhi na khronicheskuiu gipoksiiu).** G. V. Khomullo, T. V. Ivanenko, and A. N. Cherniaev. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 68-72. 23 refs. In Russian.

A77-11398 # **Clinicophysiological studies of pilots with first stage hypertension (Kliniko-fiziologicheskie issledovaniia u letnogo sostava s gipertonicheskoi bolezn'iu I stadii).** S. N. Akimov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 72-77. 23 refs. In Russian.

An examination of the functional state of the cardiovascular system based on hemodynamic and polycardiographic characteristics was carried out for a group of pilots suffering from first stage hypertensive disease, and the data obtained were compared with corresponding data for 40 healthy pilots. The parameters reflecting the increase in the blood volume ejected into the blood stream were found to be the most informative. In particular, the stroke volume, cardiac output, volume rate of the ejection, power of the left ventricle, energy expenditure per one liter of the cardiac output, and the time of the isometric contraction phase were found to increase in all examined subjects. Interrelations between the cardiac output and the peripheric resistance allowed to identify three hemodynamic varieties of hypertension: cardiac type characterized by an increase in the minute blood output (15 persons), vascular type with an increase in the peripheric resistance (11 persons), and mixed type, involving an increase in both parameters (4 persons). Methods of treating are recommended for each of these varieties. S.N.

A77-11399 # **Ultrasonic Doppler cardiography in the medical control system (Ul'trazvukovaia Doppler-kardiografiia v sisteme meditsinskogo kontrolia).** A. N. Kozlov, V. A. Degtiarev, V. S. Bednenko, and V. S. Markov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 77-81. 13 refs. In Russian.

A total of 550 ultrasonic Doppler cardiograms (USDC) of 43 healthy pilots were recorded to obtain normative USDC characteristics, which should permit an adequate interpretation of cardiograms in medical control. The method of analyzing USDCs is described. Typical USDC signal components related to various cardiac cycle phases in healthy persons are presented for major location points of the heart. Numerical results of phase analysis of the cardiac cycle and spectral analysis of the cardiograms, characterizing elasticity and motion velocities of cardiac elements in various zones of the heart, are discussed. The low level of variations in velocities for different zones proved the possibility of a nonsearch heart location over a comparatively wide range. The elasticity characteristics showed that the level of the reflected signal depends primarily on the energetic contribution from the cardiac walls. S.N.

A77-11400 # **Results of an impedance pneumography study (Rezul'taty issledovanii impedansnoi pnevmografii).** V. G. Savel'eva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 81, 82. In Russian.

The possibility of obtaining numerical characteristics of respiratory volumes was studied in two sets of experiments using the bipolar method of impedance pneumography. Noise stability and informativity were compared for two techniques: impedance pneumography from a rheopneumogram (RPG), and pneumography with a strain gage from a perimetrogram (PG), with a spirogram (SpG) used as a reference technique. It is shown that neither PG nor the RPG permit accurate data on respiratory volumes to be obtained. The degree of correlation between RPG and SpG was found, however, substantially higher than that between PG and SpG. The noise stability of both methods was evaluated by calculating the frequency of respiration during physical exercises and reading. Both methods exhibited a low noise stability to physical exercises (that of RPG being slightly higher), while the RPG method showed a high noise stability to reading. Change in respiration depth considerably influenced the amplitude of RPG curves but had little effect on PG curves. The second set of experiments concentrated on the correlations between the RPG amplitudes and respiratory frequency and depth. It was shown that using the RPG method, it is possible to obtain data not only on respiratory frequency and rhythm, as with PG, but also on the respiratory depth. S.N.

A77-11401 # **Possibility of prolonged stay in water by means of a 'dry' immersion method (Vozmozhnost' provedeniia dlitel'noi vodnoi immersii metodom 'sukhogo' pogruzheniia).** E. B. Shul'zhenko and I. F. Vil'-Vil'iams. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 82-84. 5 refs. In Russian.

A technique is developed for a long-duration experiment of 'dry' immersion of a man into water in order to simulate some effects of weightlessness and hypokinesia. Human subjects placed in an ample high-elasticity waterproof cloth fixed to the boards of a special water bath (water temperature about 34 deg C) are immersed into water, in lying position, without using any other support. Experiments employing this technique were carried out on 14 subjects for 13 days, and on 2 subjects for 56 days, using standard methods of continuous medical control during the whole period of the experiment. The technique of 'dry' immersion permits to obtain physiological information from any part of the body. No adverse effect of the immersion conditions on the subjects was observed. S.N.

A77-11402 # **Antitissular antibodies and complement in hypokinesia (Protivotkanevye antitela i komplement pri gipokinezii).** V. V. Portugalov, A. A. Ivanov, and V. N. Shvets. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 84-86. 11 refs. In Russian.

Long-time hypokinesia leads to the development of distrophy in striated muscles; the same process occurs during myasthenia, a disease having an autoimmune component in its pathogenesis. An attempt is made to find out the role of autoimmune mechanisms in the pathogenesis of myodistrophy during hypokinesia, with autoantibodies and complement selected as indices of the possible autoimmunizing effect of hypokinesia. Male mongrel white rats were kept under conditions of hypokinesia. Their total weight showed a decrease of down to 74% on the 7th day, 87% on the 15th day, 73% on the 30th day, and 65% on the 60th day of the experiment, as compared to the weight of a reference group of animals. An immunologic blood analysis showed a drastic increase in complemental activity of the blood serum during the whole observation period. A decreased level of antitissular antibodies was observed from the 7th to the 15th day, whereas during the period of 30th to 60th day this level increased drastically. The second period was found to coincide with that of an increased frequency of finding agglutinin antibodies to ram erythrocytes. A mechanism explaining the observed phenomena is tentatively proposed. S.N.

A77-11403 # **Change in state characteristics of the parasympathetic nervous system during hypokinesia in rabbits (Ob izmenenii pokazatelei sostoianiia parasimpaticheskoi nervnoi sistemy pri gipokinezii u krolikov).** G. D. Reushkina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Mar.-Apr. 1976, p. 86-88. 37 refs. In Russian.

A77-11404 # **On the expert diagnostic value of physiological parameters for objective monitoring of a pilot's condition in flight (Ob ekspertno-diagnosticheskoi tsennosti fiziologicheskikh parametrov ob'ektivnogo kontrolia sostoianiia letchika v polete).** I. D. Malinin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 3-8. 37 refs. In Russian.

Effective methods are examined for expert diagnosis of a variety of pathological conditions arising during the action of unfavorable flight factors on pilots. Selection of the necessary physiological parameters for pilot evaluation should provide solutions to three key diagnostic problems: Ascertainment of sudden death during flight, diagnosis of acute diseases with disordered consciousness and reduced working capacity, and determination of hazardous changes in the psychic state of a pilot. The information collected by relevant parameters is discussed. These parameters include the heart rate, EKG, EMG, arterial blood pressure, and photoplethysmogram of vascular flow in ear lobule and skin. Other parameters comprise body and skin temperature, pneumatachogram and changes in the rib cage perimeter, pulmonary ventilation, EOG, EEG, and GSR. Aviation medicine should rely on computer-aided data processing for a rapid and reliable diagnosis of pilots. S.D.

A77-11405 # **Rat experiment on a 22-day flight on the biosatellite Cosmos 605 /Objectives and methods/ (Eksperiment s krysami v 22-sutochnom polete na biologicheskom sputnike 'Kosmos-605' /Zadachi i metody/).** E. A. Il'in, L. V. Serova, and A. D. Noskin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 9-14. In Russian.

In the 1974 experiment onboard the Cosmos 605 satellite, Wistar rats were put in cages equipped with a feeder, water supply, light source, and ventilation device. The principal objective of the experiment was to study the effects of 22 days of weightlessness and the subsequent period of readaptation to earth's gravity on the morphological and functional characteristics of the rat's physiology. A series of postflight clinical, physiological, morphological, cytological, and biochemical studies were performed on the rats. Tissue examinations were also conducted and remote aftereffects were studied. B.J.

A77-11406 # **Activity of DNA depolymerases in the rat spleen after flight aboard the Cosmos 605 satellite (Aktivnost' depolimeraz DNK v selezenke krys posle poleta na sputnike 'Kosmos-605').** V. F. Makeeva, G. S. Komolova, L. V. Serova, E. V. Belikova, and I. A. Egorov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 14-17. 14 refs. In Russian.

The activity of enzymes involved in DNA disintegration (acid and alkaline DNA-ases) was measured in the spleen of rats onboard the Cosmos 605 satellite for 22 days. The activity of alkaline DNA-ase remained unaltered, whereas that of acid DNA-ase increased more than twice. The activity of acid DNA-ase returned to the normal postflight day. Analysis of the characteristic viscosity of native and denatured DNA showed that enzyme activation was not followed by degradation changes in the DNA molecule. (Author)

A77-11407 # **Changes in the monosynaptic H-response of man during altitude decompression (Izmeneniia monosinapticheskogo H-refleksa pri vysotnoi dekompressii u liudei).** L. V. Kaliuzhnyi and I. N. Zakharova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 17-22. 17 refs. In Russian.

Fifteen subjects were tested for altitude decompression disorders in a hypobaric chamber under the following simulated altitudes: ascent from sea level to a height of 11,000 m, descent to 3000 m, and repeated ascents from 3000 m to 7000-10,000 m. The key feature of the test was the neuroelectrical H-response of the leg muscles correlated with the decompression disorders. When bends developed in a leg, the amplitude of the H-response decreased in that leg and increased in the other leg. During the descent, changes in the amplitudes of the response proved to be just the opposite. The decrease in the H-response was correlated with oxygen deficiency of nerve afferents, while an increase was correlated with a supraspinal effect. B.J.

A77-11408 # **Prevention of decompression sickness as related to repeated extravehicular activities (Profilaktika dekompressionnoi bolezni primenitel'no k usloviiam mnogokratnykh vykhodov v kosmos).** I. N. Cherniakov, V. A. Glazkova, and I. V. Maksimov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 23-26. 11 refs. In Russian.

Six 3-day experiments were carried out on 6 subjects in an altitude chamber. The experiments simulated repeated extravehicular activities i.e. intensive work at an altitude of 10,000 m in a helmet or at an altitude of 40,000 m in a space suit pressurized at 200 mm Hg. It was demonstrated that altitude decompression could be prevented by desaturation consisting of prolonged exposure to the hypobaric atmosphere (430 mm Hg) and 100% O or a 40% O2 and 60% N2 mixture. During the 3-day experiment the subjects made seven 3-4 hour excursions, showing no symptoms of decompression sickness. (Author)

A77-11409 # **State of the human motor system during exposure for many days to a nitrogen-oxygen environment at pressures of up to 5 atm (O sostoianii dvigatel'nogo apparata cheloveka v period mnogosutochnogo prebyvaniia v azotno-kislovodnoi srede pri davlenii do 5 ata).** R. L. Boush. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 26-31. 18 refs. In Russian.

The state of the motor function of individuals exercizing on a bicycle ergometer in an altitude chamber containing a nitrogen-oxygen environment at 5.0 atm was studied. Maximum isometric force, precision of movement control and muscular tension, accuracy and velocity of movements were recorded. The maximum force, precision and velocity of movements varied phasically. The greatest changes were found on the 1st-3rd and 6th-7th days of the exposure. These parameters returned to the normal when the atmosphere pressure was reduced to 1.0 atm. During exercise at an elevated pressure, the muscular force, accuracy and velocity of movements decreased. During exercise at a normal pressure, similar changes were less distinct and consistent. (Author)

A77-11410 # **Adrenal function in man during exposure to a hyperbaric environment for many days /N2-O2, 5 atm/ (Funktsiia nadpochechnikov pri mnogosutochnoi ekspozitsii cheloveka v usloviiakh giperbarii /N2-O2, 5 ata/).** N. M. Turubiner. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 32-37. 37 refs. In Russian.

Human subjects were exposed to a nitrogen-oxygen environment at 5 atm, performing various activities. The adrenal function of the subjects was examined for catecholamine and corticosteroid excretion in the urine. During environmental adaptation, the excretion of catecholamines and corticosteroids varied phasically. After 3 days of the 7-day exposure to the hyperbaric atmosphere and during decompression the exretion of norephinephrine increased and that of corticosteroids, particulary 17-corticosteroids, decreased. The diurnal rhythm of the excretion changed in spite of the normal life regimen of the subjects. These variations can be considered as adaptive-protective responses of the human body. (Author)

A77-11411 # **Effect of body position relative to the gravity vector on water balance (Vliianie na vodnyi obmen polozheniia tela otnositel'no vektora gravitatsii).** V. P. Krotov and L. L. Romanovskaia. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 37-41. 20 refs. In Russian.

A combined effect of hypokinesia and body position at different angles to the gravity vector on the water content and rate of its metabolism was studied. It was shown that bed rest reduced

total water losses and the rate of its metabolism. It was body position relative to the gravity vector rather than bed rest that influenced the total water content in the body. (Author)

A77-11412 # **Recovery of muscular functions in rats after prolonged hypokinesia (Vosstanovlenie funktsii myshts u krys posle dlitel'nogo ogranicheniia podvizhnosti).** V. S. Oganov, A. N. Potapov, G. S. Katinas, and M. P. Skorogliadova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 41-47. 14 refs. In Russian.

Experiments were conducted to measure the recovery dynamics (time and force parameters) of the isometric contractions and morphological characteristics of the hind limb muscles of white rats kept in prolonged hypokinesia for 130 days and then under surveillance for 3 months. The soleus muscle was found to display changes indicative of atrophy, while the ext. digit. longus and plataris muscles showed recovery of force parameters. The latter muscles also displayed delayed contraction due to an increase in the time of tension development and semirelaxation. B.J.

A77-11413 # **Hemopoietic organs of mice during hypokinesis (Organy krovetvoreniia myshei pri gipokinezii).** V. N. Shvets and N. P. Krivenkova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 47-53. 12 refs. In Russian.

Experiments were performed on inbred male mice to study the capacity of hemopoietic cells for colony formation and the pattern of their differentiation during hypokinesia. Lymphoid organs were weighed; hemopoietic cells were counted; and blood smears were prepared by standard methods. The colony forming properties and the differentiation capacity of the hemopoietic cells of the spleen and bone marrow were studied using a method of in vivo culturing and gamma irradiation. The differentiation capacity of colony forming units from the spleen and bone marrow were not altered toward erythro-, myelo-, and thrombo-poiesis. B.J.

A77-11414 # **Some principles for the recovery of central vision after temporary blindness (Nekotorye zakonomernosti vosstanovleniia tsentral'nogo zreniia posle vremennogo osleplenila).** V. I. Kartsev and N. K. Luk'ianov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 53-58. 17 refs. In Russian.

Forty healthy subjects were tested in an effort to determine the mechanisms of the recovery of central vision after temporary blindness experienced by pilots and astronauts due to prolonged light adaptation. The experiments consisted of two steps: light adaptation produced in a definite time interval by a white screen illuminated by the sun or an incandescent lamp, and a study of the recovery of visual acuity in the range 0.1-0.5 under conditions of dark adaptation after the lamp is turned off. It is shown that the recovery time increased exponentially with an increase in stimulating light intensity. B.J.

A77-11415 # **Dependence of human body weight loss on space flight duration (Zavisimost' poteri vesa cheloveka ot prodolzhitel'nosti kosmicheskogo poleta).** V. V. Verigo. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 58-61. In Russian.

A formula is proposed for determining weight losses in the first approximation during a space mission, assuming that humans may adapt to space flight effects. The process depended on two parameters for maximum body weight loss and adaptation time. Weight estimates of Skylab crewmembers obtained by the formula are found to be in good agreement with actual results. The typical adaptation time was two days. Possible ways of constructing a more precise model of weight changes and its use to predict the condition of crewmembers are discussed. (Author)

A77-11416 # **Comparative characterization of electrocardiograms in flight personnel with normal and excessive weight under moderate hypoxia (Sravnitel'naia kharakteristika elektrokardiogramm u letnogo sostava s izbytochnym i normal'nym vesom tela v usloviiakh umerennoi gipoksii).** I. R. Grishin, P. G. Kozacha, and L. A. Stefanov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 61-64. In Russian.

A77-11417 # **Methods for studying the tolerance of pilots to inflight acceleration (Metodika issledovaniia perenosimosti letchikom peregruzok v usloviiakh poleta).** P. M. Suvorov, V. I. Babushkin, and D. Iu. Arkhangel'skii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 64-67. In Russian.

Experiments were performed in a specially equipped aircraft with dual control to study pilot tolerance to inflight acceleration, consisting of three dives, attaining levels of 3.0, 5.0, and 6.0 g for 30 s at intervals of 1-2 min and an onset rate of 0.4-0.6 g/s. The onboard monitoring equipment consisted of an ECG, an ear pulse rate recorder and a motion picture camera for cinematography of the pilot's face during exposure to acceleration. The most interesting result was a sharp decrease of the pulse rate in the blood vessels of the ear (25% and more below the base level) accompanied in 80% of the cases by visual disorders. B.J.

A77-11418 # **Evaluation and application of the quantitative indices of the quality of operator work (Otsenka i primenenie kolichestvennykh pokazatelei kachestva raboty operatorov).** V. V. Lebedev and V. A. Krutov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 68-71. In Russian.

The paper describes a method for determining quantitative indices of the quality of the performance of operators involved in spacecraft control. Quality indices are calculated from statistical data obtained from flights and flight simulation experiments. A general scheme for evaluating quality indices is presented consisting of the following steps: collection of data of the quality of operator performance during flight and training, data processing and calculation of the statistical characteristics of performance quality, the establishment of constraints on performance quality parameters, and the calculation of quality indices. These indices are applied to the following tasks: spacecraft design, flight plan development, operator training, and operator control of spacecraft. B.J.

A77-11419 # **Investigation of the biological properties of type-A Cl. perfringens released in persons placed in a hermetic chamber (Issledovanie biologicheskikh svoistv Cl. perfringens tipa A, vydelennykh u liudei v usloviiakh prebyvaniia ikh v germeticheskoi kamere).** V. M. Shilov, E. P. Zemlianitskaia, and O. K. Borisova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 71-75. 23 refs. In Russian.

A77-11420 # **Coronary vessels of the rabbit following single irradiation of the heart area with a dose of 2400 rad (Koronarnye sosudy krolika posle odnokratnogo oblucheniia oblasti serdtsa v doze 2400 rad).** A. I. Vorob'ev and L. A. Iakovleva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 75-77. In Russian.

A77-11421 # **Evaluation of the state of the cardiovascular systems of helicopter flightcrews (Otsenka sostoianiia serdechno-sosudistoi sistemy u ekipazhei vertoletov).** L. V. Chireikin, E. V. Bondarev, V. A. Egorov, V. A. Kolosov, and B. P. Bataev. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 78, 79. In Russian.

Variational ECG pulsometry was used to study the heart rhythms of 33 healthy helicopter flight crew members in the age

range 20-40 years. Variational pulsograms were constructed on the basis of RR intervals of 0.05 s, and the following values were considered during analysis of the variability of the dynamic series of intervals: the difference between the maximum and minimum values of RR, the mean value of RR, the root-mean-square deviation, the mode, the asymmetry measure, and the coefficient of variation. The major results were: a quickening of heart rate for most of the crew members in horizontal flight, evidence for sympathicotonic responses during flight, observed bradycardia for most of the crew members after flight. B.J.

A77-11422 # **Effect of alpha radiation on Chlorella vulgaris at different stages of cellular cycle (Deistvie alpha-izlucheniia na raznye stadii kletochnogo tsikla khlorelly).** L. K. Vekshina, I. S. Sakovich, and V. A. Shevchenko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 79, 80. 5 refs. In Russian.

A77-11423 # **Effect of caloric stimulation of the vestibular system on body temperature (Vliianie kaloricheskogo razdrazheniia vestibuliarnogo apparata na temperaturu tela).** I. I. Voinova and I. M. Emel'ianova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 81. In Russian.

A77-11424 # **Effect of cupric bromide on the intensity of release of gaseous substances from a waste disinfection facility (Vliianie bromnoi medi na intensivnost' vydeleniia gazoobraznykh veshchestv iz assenizatsionnogo ustroistva).** L. T. Poddubnaia and L. N. Rogatina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 81-83. 8 refs. In Russian.

A77-11425 # **Characteristics of fatigue among people of different occupations (Kharakteristika utomleniia u lits razlichnykh professii).** E. F. Polezhaev and V. A. Epikhin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 83, 84. 6 refs. In Russian.

The characteristics of muscular fatigue of three groups of workers were studied: operators whose function is characterized by insignificant levels of psychophysiological stress and by the absence of physical strain, production line workers whose work is characterized by monotony and physical strain, and automobile operators whose work is characterized by considerable psychological and neurophysiological stress and static strain. Results show the existence of three stages of development of muscular fatigue: a first stage characterized by an improvement of the indices of muscular endurance and visual motor performance, a second stage characterized by a stabilization and incipient decrease in these indices, and a third stage characterized by a sharp decrease in the indices. B.J.

A77-11426 # **Direct simulation of a radiobiological survival experiment (Priamoe modelirovanie radiobiologicheskogo eksperimenta po vyzhivaemosti).** R. A. Kuzin, V. A. Sakovich, V. G. Semenov, and V. V. Iurgov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 84-86. In Russian.

A direct computerized simulation using the method of statistical tests is used to determine the probability of survival of animals exposed to radiation. Direct simulation consists of the uniform distribution of random numbers between 0 and 1 which correspond to the probability of the death of individual animals (under the given dosage to which it is subjected). The probability of death is determined from the hypothetical dependence of the radiation sensitivity of the individual animal on dosage. If the random number is greater than this probability, the animal is supposed to be dead, and vice versa. B.J.

A77-11427 # **Functional state of the liver-pancreas system during exposure to low transverse accelerations (Funktsional'noe sostoianie gepato-pankreaticheskoi sistemy pri vozdeistvii malykh po velichine poperechno-napravlennykh uskorenii).** K. V. Smirnov, L. G. Goland, and I. L. Medkova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 86-88. 8 refs. in Russian.

A77-11428 # **Effect of psychotropic drugs on some indices of the vestibular function (Vliianie psikhotropnykh preparatov na nekotorye pokazateli vestibuliarnoi funktsii).** E. F. Lavretskaia, I. I. Voinova, and T. P. Privol'neva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 88, 89. 13 refs. In Russian.

A77-11429 # **Dynamics of changes in the galvanic skin response in man during altitude decompression (Dinamika izmeneniia kozhno-gal'vanicheskoi reaktsii u liudei pri vysotnoi dekompressii).** L. V. Kaliuzhnyi and N. M. Kirgizova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, May-June 1976, p. 90, 91. In Russian.

A77-11430 # **Cellular and molecular aspects of adaptation (Kletochnye i molekuliarnye aspekty adaptatsii).** M. G. Tairbekov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 3-9. 34 refs. In Russian.

The paper generalizes available current hypotheses about the mechanism underlying the influence of detrimental factors of the environment on the structural and functional organization of the cell. A discussion of findings pertaining to personal and other investigations suggests that the primary changes to be considered in adaptation are those occurring in cellular structures. The material foundation upon which these changes take place is represented by the biological membranes, whose chemical composition and physical properties dictate the stability of cellular organoids and the cell as a whole. The set of nonspecific changes occurring in the cell lead to complex adaptive responses above the cell and organ levels for an integrated adaptation of the organism. S.D.

A77-11432 # **Some characteristics of the metabolism of proteins and ribonucleic acids in the central nervous system of rats in space flight aboard the Cosmos 605 satellite (Nekotorye kharakteristiki metabolizma belkov i ribonukleinovykh kislot v tsentral'noi nervnoi sisteme krys, nakhodivshikhsia v kosmicheskom polete na sputnike 'Kosmos-605').** O. G. Gazenko, N. N. Demin, A. N. Panov, N. L. Rubinskaia, and R. A. Tigranian. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 14-19. 18 refs. In Russian.

A77-11433 # **Morphological effects in rats after a 22-day space flight (Morfologicheskie effekty u krys posle 22-sutochnogo kosmicheskogo poleta).** V. V. Portugalov, E. A. Savina, A. S. Kaplanskii, V. I. Iakovleva, G. I. Plakhuta-Plakutina, A. S. Pankova, E. I. Alekseev, P. I. Katunian, G. N. Durnova, and E. I. Il'ina-Kakueva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 19-25. 9 refs. In Russian.

A morphological examination of 27 rats aboard a satellite and sacrificed on the 1st-2nd and 26th-27th postflight days demonstrated no significant changes in the structural organization of the vital organs and systems of the animal body. It was, however, found that the space exposure resulted in morphologically detectable changes in the musculo-skeletal system, hemopoiesis and lymphopoiesis, hypothalamic-pituitary-adrenal system and the juxtaglomerular apparatus of the kidneys. The changes were reversible and nonspecific, and could be seen in animals in ground-based hypokinetic and other stress experiments. After flight, the animals developed some responses similar to those in humans. The results help to identify the

morphological substrate of certain changes in the human body and investigate their pathogenesis. (Author)

A77-11434 # **Effect of a 22-day space flight on the metabolism of skeletal muscle tissue in rats (Vliianie 22-sutochnogo kosmicheskogo poleta na metabolizm tkani skeletnykh myshts u krys).** M. S. Gaevskaia, A. S. Ushakov, R. A. Belitskaia, N. A. Veresotskaia, T. F. Vlasova, E. V. Kolchina, N. S. Kolganova, L. M. Kurkina, E. A. Nosova, and N. P. Rassolova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 25-30. 14 refs. In Russian.

Skeletal muscles of rats having undergone a space flight showed no changes in the content of glycogen, adenosine triphosphatase activity of myosin and protein content in protein fractions (except the T fraction where the protein content increased on the 1st day after landing and returned to the normal on the 26th postflight day). On the 1st postflight day, activities of aminotransferases and lactate dehydrogenase (LDH) of sarcoplasmatic proteins were elevated and the isoenzyme spectrum of LDH was changed as if in muscular atrophy. The amount of free amino acids in muscles was lowered. On the 26th postflight day the enzymic activity of sarcoplasmatic proteins remained increased, whereas the isoenzyme spectrum of LDH returned to the normal and the amount of free amino acids increased significantly. In the microsomal fraction of muscles the phospholipid content decreased on the 1st day after landing and returned to the normal on the 26th postflight day. (Author)

A77-11435 # **Tolerance to +Gz acceleration of pilots with a tendency toward hypotensive responses under hot climate conditions (Perenosimost' uskorenii +Gz letchikami so sklonnost'iu k gipotonicheskim reaktsiiam v usloviiakh zharkogo klimata).** S. V. Kolesnikov, R. A. Vartbaronov, and A. R. Kotovskaia. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 30-35. 12 refs. In Russian.

During acrobatic flying the acceleration tolerance of healthy and hypotensive pilots was studied under hot climate conditions. From the professional viewpoint, the pilots were very similar. The tolerance was determined on the basis of indirect indices derived from flight accelerograms (maximum and median acceleration values, number of peaks over 4 g, time of flying). The maximum value and the number of peaks of acceleration (+Gz) over 4 g can be recommended as practically indicative of the tolerance. The observations showed an adverse effect of initial hypotension occurring in hot climate on the acceleration tolerance. As compared with the controls, the tolerance decrease in 12 hypotensive pilots was 1.1 g and 0.6 g of the maximum and median values, respectively. (Author)

A77-11436 # **Some responses of man to prolonged centripetal accelerations /+Gz/ of small values (Nekotorye reaktsii cheloveka na dlitel'nye tsentrostremitel'nye uskoreniia /+Gz/ malykh velichin).** R. R. Galle, V. V. Usachev, L. N. Gavrilova, L. G. Elkina, P. A. Elkin, I. S. Krikun, V. G. Ovechkin, and B. V. Ustiushin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 35-40. 20 refs. In Russian.

The effect of centripetal accelerations (+Gz) of low values (0.5-0.6 g) applied for four days against the background of relative hypokinesia was investigated. The peripheral and intracranial circulations, equilibrium function and morphological composition of the capillary blood were examined. During the first three centrifugation days the hemodynamic state differed insignificantly from the initial level. On the fourth day, signs of cardiovascular deconditioning were observed by the orthostatic test. Changes in the peripheral blood indicated a moderate stress-response which persisted throughout the entire experiment. Equilibrium changes that were observed on the first centrifugation day regressed and the post-test function did not essentially differ from the initial level. The experimental results show that inertia forces can be used to diminish the detrimental effects of hypokinesia. (Author)

A77-11437 # **Effect of systematic gravity exposures on external respiration during prolonged immersion (Vliianie sistematicheskikh gravitatsionnykh vozdeistvii na funktsiiu vneshnego dykhaniia v usloviiakh dlitel'noi immersii).** Iu. N. Kamenskii, E. B. Shul'zhenko, and V. G. Andreeva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 40-45. 29 refs. In Russian.

Subjects were exposed to 13-day water immersion alone or combined with centrifugation. The immersion did not influence the state of ventilation and gas exchange at rest, diminished significantly the functional capabilities of external respiration. An exposure to acceleration during the second half of water immersion resulted in the normalization of the functional reserves of external respiration. This may be the result of an increase in the total physical tone of the body. (Author)

A77-11438 # **Human cardiovascular responses to orthostatic tests after highland adaptation (Reaktsiia serdechno-sosudistoi sistemy cheloveka na ortostaz posle adaptatsii k vysokogor'iu).** V. S. Georgievskii, V. I. Korol'kov, and V. M. Mikhailov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 45-49. 31 refs. In Russian.

Orthostatic tolerance of 18 healthy test subjects (three groups of 6 persons each) who were exposed to an altitude of 2200 m for 12 days and 3200 m for 12 days was studied. The first group subjects remained in bed with minimized motor activity. The second group test subjects rested in bed and twice a day performed physical exercises with an energy expenditure of 300 kcal/day. The third group subjects led a normal life. It is shown that a prolonged restriction of motor activity and a decrease in the blood hydrostatic pressure of healthy test subjects in highlands result in diminished orthostatic tolerance. Physical exercises prove ineffective in that case. The subjects who led a normal life showed increase cardiovascular responses to the orthostatic tests. (Author)

A77-11439 # **Quantitative evaluation of ultrastructural changes in the myocardium of the rat during prolonged hypokinesia (Kolichestvennaia otsenka ul'trastrukturnykh izmenenii v miokarde krys pri dlitel'noi gipokinezii).** V. S. Romanov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 50-54. 35 refs. In Russian.

Experiments were conducted to study and quantitatively assess the ultrastructural changes in the organoids of the myocardial cells in the right and left ventricles of the heart in restrained rats during a hypokinetic period of 120 days. Morphometric analysis revealed that the redistribution of chromatin in the nuclei of myocardial cells was similar in the two ventricles of the rats. The ratio of the total area of mitochondria to the total area of myofibrils varied periodically throughout the experiment, with increased area of mitochondria by the end of the 120th day. Myocardial changes by the end of hypokinetic period are indicative of a new level of cardiac activity. Quantitative changes in the myocardial organoids were more significant in the left than in the right ventricle. S.D.

A77-11440 # **Effect of nerobol on the fluid-electrolyte metabolism and function of kidneys in man during 120-day hypokinesia (Vliianie nerobola na vodno-solevoi obmen i funktsiiu pochek cheloveka pri 120-sutochnoi gipokinezii).** A. I. Grigor'ev, Z. P. Pak, Iu. S. Koloskova, G. I. Kozyrevskaia, M. M. Korotaev, and Iu. E. Bezumova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 55-59. 11 refs. In Russian.

A77-11441 # **Diagnostic significance of free amino acid content in the blood plasma during dietary protein deficiency in man (O diagnosticheskoi znachimosti sodershaniia svobodnykh aminokislot v plazme krovi pri alimentarnoi belkovoi nedostatochnosti u cheloveka).** V. G. Vysotskii, T. F. Vlasova, A. S. Ushakov, and T. V. Nevolina. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 59-64. 27 refs. In Russian.

A77-11442 # **Calorimetry of the human body in a hermetic enclosure (Kalorimetriia cheloveka v zamknutom germoob'eme).** A. A. Glushko, S. M. Gorodinskii, and B. V. Orekhov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 64-69. 9 refs. In Russian.

Results are presented for an experimental evaluation of a biocalorimeter carried on the body and a heat-measuring suit. Theoretical concepts are outlined underlying direct calorimetry of a suited man, along with a block diagram of the biocalorimeter used to examine the energy parameters of the human body, including metabolic rate, heat production, heat release and heat balance. The data obtained were statistically treated and heat effects were characterized by empiric expressions. It was for the first time that the personal calorimeter and calorimetric suit made it possible to collect information on the thermal state of the human body. This information helps to diagnose the health condition of man and to standardize environmental parameters in aviation and space suits. (Author)

A77-11443 # **Investigation of the biological effect of vibration on plants (Izuchenie biologicheskogo deistviia vibratsii na rasteniiakh).** J. A. Fischere and Iu. I. Shaidorov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 69-72. 12 refs. In Russian.

Results are presented for an experimental study designed to assess the biological impact of vibration on lettuce seeds and sprouts grown at optimal (20 C) and suboptimal (4 C) temperatures. It is shown that the effectiveness of vibration is little dependent on its frequency (500-2000 Hz), but the sensitivity of the plants to vibration depends on their physiological condition. The disorders caused by vibration are of temporary character, i.e., processes in the plants return to the normal in a relatively short time. S.D.

A77-11444 # **Search for a urine preservative as related to the oxidative-catalytic method of water regeneration (Izyskanie konservanta mochi primenitel'no k okislitel'no-kataliticheskomu metodu regeneratsii vody).** A. G. Prishchep and V. B. Gaidadymov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 73-75. 5 refs. In Russian.

Experiments were conducted for a comparative evaluation of various chemical compounds as urine preservatives in regenerative water supply systems in manned spacecraft. The urine preservatives discussed were formalin, sodium metabisulfite, sorbic acid, para-oxybenzoic acid, 9-oxyquinoline, Catamine AB, Catapin B-300, chloramine, mono-Chlorantine, and sulfo-Chlorantine. Analysis of microbicidal activity and quality of regenerated water revealed that 0.1% formalin appears to be the best compound for conserving urine for more than 3 months. S.D.

A77-11445 # **Hegglin's syndrome in flight personnel with atherosclerotic coronary cardiosclerosis and its clinical evaluation (Sindrom Khegglina u lits letnogo sostava s aterosklerroticheskim koronarokardioskerozom i ego klinicheskaia otsenka).** V. M. Kondrakov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 75-78. 9 refs. In Russian.

A77-11446 # **Combined effect of hypokinesis and elevated oxygen content on animal resistance to carbon monoxide (Kompleksnoe vozdeistvie gipokinezii i povyshennogo soderzhaniia kisloroda na ustoichivost' zhivotnykh k okisi ugleroda).** B. I. Abidin, V. I. Belkin, and V. V. Kustov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 79, 80. In Russian.

A77-11447 # **Effect of psychophysiological self-adjustment on flight training (Vliianie psikhofiziologicheskoi samoreguliatsii na protsess letnogo obucheniia).** D. I. Shpachenko and K. I. Mirovskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 81, 82. In Russian.

A77-11448 # **Study of subjective evaluations of the normal state of operators in a long-term tracking procedure (Izuchenie sub'ektivnykh otsenok sobstvennogo sostoianiia operatorov v protsesse dlitel'nogo slezheniia).** B. P. Shestkov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 82-84. In Russian.

A77-11449 # **Physicochemical purification of the gas-vapor phase formed during dessication of solid waste from human vital activity (Fiziko-khimicheskaia ochistka parogazovoi fazy, obrazuiushcheisia pri sushke tverdykh otkhodov zhiznedeiatel'nosti cheloveka).** G. S. Siniak, L. V. Dagaeva, Iu. V. Pepeliaev, N. V. Kel'tsev, L. Ia. Margolis, and B. G. Gusarov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, July-Aug. 1976, p. 84-86. 7 refs. In Russian.

A77-11450 # **Preliminary results of medical studies during the flight of the second expedition of the Salyut 4 orbital station (Predvaritel'nye rezul'taty meditsinskikh issledovanii, vypolnennykh vo vremia poleta vtoroi-ekspeditsii orbital'noi stantsii 'Saliut-4').** E. I. Vorob'ev, O. G. Gazenko, N. N. Gurovskii, Iu. G. Nefedov, B. B. Egorov, R. M. Baevskii, I. I. Brianov, A. M. Genin, V. A. Degtiarev, and A. D. Egorov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 3-18. In Russian.

The paper discusses the program and results of medical investigations concerning the 63-day stay of crewmembers aboard the Salyut 4 orbital station. Attention is focused on the responses of the cardiovascular system to weightlessness. Other areas discussed include the vestibular analyzer, external respiration, metabolism, blood perfusion of the brain, and other related topics. During space flight, the human body is found to adapt to the new environment through a period of adaptive readjustment and a period of relative stabilization, the latter being generally reached after 1.5 months of exposure to weightlessness. No substantial physiological changes are observed which would prevent further planned increases in the duration of future space missions. S.D.

A77-11451 # **Orthostatic tolerance of cosmonauts after 30- and 63-day flights onboard the orbital base Salyut-4 (Ortostaticheskaia ustoichivost' u kosmonavtov posle 30- i 63-sutochnykh poletov na orbital'noi stantsii 'Saliut-4').** V. V. Kalinichenko, B. F. Asiamolov, and A. F. Zhernavkov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 18-23. 9 refs. In Russian.

Reactions of the circulation system of cosmonauts to inclinations in the head-up and head-down positions were studied after a 30-day and a 63-day flight. All the four cosmonauts showed a decline in orthostatic tolerance. An improved system of countermeasures against the unfavorable effects of weightlessness, used during the 63-day flight helped to maintain a better orthostatic tolerance of the crew members than during the 30-day flight. It is assumed that a rapid improvement in orthostatic tolerance after flights indicates an adequate maintenance of functional capabilities of circulation and suggests possible stimulation of its antigravity mechanisms prior to reentry in order to prevent postflight orthostatic disorders. An exposure to weightlessness increased the capacity of circulation to counteract the blood redistribution in the cranial direction in the head-down position. This capacity became more pronounced and stable with increasing flight time. (Author)

A77-11452 # **Cardiorespiratory responses of cosmonauts to graded physical work after 30- and 63-day flights aboard the orbital base Salyut-4 (Reaktsii kardio-respiratornoi sistemy na dozirovannuiu fizicheskuiu nagruzku u kosmonavtov posle 30- i 63-sutochnykh poletov na orbital'noi stantsii 'Saliut-4').** A. V. Beregovkin, A. S. Vedolazov, V. S. Georgievskii, V. V. Kalinichenko, N. V. Korelin, V. M. Mikhailov, Iu. D. Pometov, V. V. Shchigolev, and B. S. Katkovskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 24-29. 11 refs. In Russian.

Cardiorespiratory responses of Salyut-4 crew members to

exercises (600 kgm/min for 7 min) on a bicycle ergometer in the supine position were studied. It was found that the 30- and 63-day flights induced a certain decrease in the response of the organisms resulting in a less economic functioning of the cardiorespiratory system during exercises. The degree of postflight changes in the 30- and 63-day crew members was alike. At the same time the cardiorespiratory system of the 63-day crew members returned to the preflight level more rapidly than that of the 30-day cosmonauts. (Author)

A77-11453 # Theoretical aspects of the problem of predicting the state of the human organism during space flight (Teoreticheskie aspekty problemy prognozirovaniia sostoianiia organizma cheloveka vo vremia kosmicheskogo poleta). Iu. M. Svirezhev, N. I. Vikhrov, and V. V. Verigo. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 30-37. In Russian.

The general principles are examined of the application of mathematical methods to the development of systems for predicting the state of the human organism during space missions. A prediction method based on the concepts of homeostasis and general adaptation syndrome is outlined. Some aspects of the application of expertise estimates and statistical approximation methods to the prediction of changes in various indices of crew members are discussed. V.P.

A77-11454 # Protein fractions and their enzyme activity in the rat myocardium after a 22-day space flight (Belkovye fraktsii i ikh fermentativnaia aktivnost' v miokarde krys posle 22-sutochnogo kosmicheskogo poleta). M. S. Gaevskaia, N. A. Veresotskaia, N. S. Kolganova, E. V. Kolchina, L. M. Kurkina, and E. A. Nosova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 37-40. 9 refs. In Russian.

No significant changes in the content of sarcoplasmic and myofibril proteins were found in the myocardium of rats after a 22-day flight aboard a biosatellite. On the 2nd and 26th postflight days, the activity of aspartate and alanine aminotransferases of sarcoplasmatic proteins increased while the total activity of lactate dehydrogenase and its isoenzyme spectrum remained unchanged. On the 2nd postflight day, the ATPase activity of myosin of the myocardium was substantially lower, but returned to the normal state on the 26th postflight day. This decline in the ATPase activity of myosin may be regarded as an adaptive reaction to weightlessness. (Author)

A77-11455 # Effect of the 22-day space flight factors on the state of sex glands and reproductive function of rats (Vliianie faktorov 22-sutochnogo kosmicheskogo poleta na sostoianie polovykh zhelez i reproduktivnuiu sposobnost' krys). G. I. Plakhuta-Plakutina, L. V. Serova, A. A. Dreval', and S. B. Tarabrin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 40-47. 17 refs. In Russian.

The paper presents the results of a morphological examination of the testes of Wistar rats after 22 days aboard the biosatellite Cosmos-605. Histological, histochemical, electron microscopic and biometric investigations of sex glands carried out 24 to 48 hours and 26-27 days after the flight showed that exposure of the rats to weightlessness and other space flight factors induced no morphological changes in the spermatogenic tissues or disorders in the spermatogenic process of the rats. The offspring of male rats that were exposed to 22-day weightlessness did not differ from the control animals with respect to the number of the newborn, their weight at birth, weight gain during the first postnatal month, resistance to hypoxia, etc. (Author)

A77-11456 # Aspects of optimizing rotation tests in electronystagmography (Voprosy optimizatsii vrashchatel'nykh testov v elektronistagmografii). Iu. P. Ozerov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 48-52. 9 refs. In Russian.

Optimization of rotation tests is discussed with a view toward the classification of electronystagmograms. A criterion for the effectiveness of thermal rotary, and other action on the vestibular analyzer, which takes into account the statistical properties of electronystagmograms of various classes, is proposed. It is shown that variational methods can be used effectively to determine the type of external effects. This approach is used to identify optimal action in the discrimination between two electronystagmograms belonging to different classes. The type of action is obtained in the form of a sequence of angular acceleration delta-pulses. V.P.

A77-11457 # Changes in central and peripheral hemodynamics, using prolonged antiorthostatic hypokinesia to simulate weightlessness (Izmeneniia tsentral'noi i perifericheskoi gemodinamiki pri dlitel'noi antiortostaticheskoi gipokinezii kak modeli nevesomosti). D. G. Maksimov and M. V. Domracheva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 52-57. 30 refs. In Russian.

A77-11458 # Periods of retainment of increased general resistance of the organism under different conditions of adaptation to oxygen deficiency (O srokakh sokhraneniia povyshennoi rezistentnosti organizma pri razlichnykh rezhimakh adaptatsii k kislorodnoi nedostatochnosti). A. A. Aidaraliev and A. S. Shanazarov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 57-62. 19 refs. In Russian.

The altitude stability of white rats was studied for stepwise and nonstepwise acclimatization to heights of 3200 m. Tests made on the third, seventh, fifteenth, thirtieth, forty fifth, and sixtieth days of the acclimatization process showed that stepwise acclimatization results in a higher resistance to extreme external factors as compared to nonstepwise acclimatization. V.P.

A77-11459 # Method of calculating the excess pressure in human lungs resulting from cabin decompression (Metod rascheta izbytochnogo davleniia v legkikh cheloveka pri dekompressii kabiny letatel'nogo apparata). V. S. Iakovlenko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 62-68. 5 refs. In Russian.

The differential equations of the mathematical model proposed are well suited for obtaining computer-aided estimates of the positive pressure in human lungs upon explosive cabin decompression. In addition, a simplified pressure computation method is developed which utilizes a special decompression diagram for a rigid tank connected by a hole of constant area with the cabin. A distinctive feature of the method is that it takes into account both the efflux of the air from the lungs and their expansion during decompression. The importance of simultaneously allowing for these two processes is demonstrated by an example. V.P.

A77-11460 # Pathomorphological changes in rat organs in the case of chronic inhalation of a polyethylsiloxane fluid (Patomorfologicheskie izmeneniia v organakh krys pri khronicheskom ingaliatsionnom vozdeistvii polietilsiloksahovoi zhidkosti). G. P. Tikhomov and Iu. P. Bizin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 69-74. 10 refs. In Russian.

A77-11461 # Medical screening of flight personnel in certain types of chronic diseases of the myocardium (Vrachebnaia ekspertiza letnogo sostava pri nekotorykh formakh khronicheskikh boleznei miokarda). E. T. Malyshkin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, Sept.-Oct. 1976, p. 74-78. 8 refs. In Russian.

Cardiovascular diseases are known to be the most frequent cause of flight personnel disqualification. The paper is concerned with the expert diagnosis of cardiosclerosis in flight personnel subjected to various kinds of psychological stress. The major criteria for a correct diagnosis of myocardial diseases are shown to be (1) the presence or absence of symptoms for coronary or general circulation insufficiency from results of compulsory special complex of clinicophysiological tests; (2) the pronouncedness of changes in the myocardium and blood vessels, along with the functional capacity of the cardiovascular system; (3) the evolutionary course of the underlying disease; (4) subjective feelings of flight personnel; (5) data on medical and service characteristics, along with the physician's dynamic observations; and (6) the presence or absence of individual burden associated with family history. S.D.

A77-11462 # **Quantitative histochemical determination of creatine kinase activity in nanogram amounts of rat myocardium (Kolichestvennoe gistokhimicheskoe opredelenie aktivnosti kreatinkinazy v nanogrammovykh kolichestvakh miokarola krysy).** I. B. Krasnov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 78, 79. 10 refs. In Russian.

A quantitative histochemical method is proposed for measuring the activity of creatine kinase in myocardium tissue fragments having a weight of dry tissue in the range 80-100 ng. The enzyme activity is measured with respect to the phosphocreatine-to-creatine reaction by means of fluorometric measurement of creatine. Results are presented for an experimental study in which the proposed method is used to determine the creatine kinase activity in the apex of the heart and the wall of the right ventricle in rats having stayed 22 days in space flight aboard the Cosmos 65 satellite and were sacrificed on the 2nd and 27th day after landing. The results are compared with rats under the same conditions in a ground-based experiment without weightlessness. The absence of differences in the level of creatine kinase activity in in-flight and ground-based animals indicate that after 22 days of space flight the rats possess total myocardial capacity to synthesize ATP from phosphocreatine and ADP, which supplies the energy necessary to sustain the contractile function of the heart. S.D.

A77-11463 # **Effect of orotic acid on weight dynamics in rats subjected to restrained motor activity (Vliianie orotovoi kisloty na dinamiku vesa krys pri ogranichenii dvigatel'noi aktivnosti).** B. B. Egorov and R. I. Gritsiuk. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 80-82. In Russian.

Experiments were conducted on unrestrained and restrained mongel male rats weighing about 100 g to study the effect of orotic acid administration on the weight dynamics of the animals. The rats were divided in 4 groups with 25 animals in each. The control group contained unrestrained animals. The 2nd group comprised unrestrained animals who received a daily dose of 0.1 g/kg body weight of orotic acid in their food. The rats in the 3rd and 4th groups were submitted to restrained motor activity in cages, but only the 4th group received a daily dose of orotic acid. The composition of peripheral blood by the 30th day of the experiment is found to remain within the norms of biological species. A major conclusion is that reduction in the weight of the rats subjected to hypokinesia can be attenuated by administration of orotic acid. S.D.

A77-11464 # **Effect of blood redistribution in the human organism on the perception of body position in space (O vliianii pereraspredeleniia krovi v organizme na vospriiatie polozheniia tela v prostranstve).** A. S. Barer and E. P. Tikhomirov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 82, 83. In Russian.

Results are presented for decompression experiments on subjects provided with prophylactic vacuum suits, with decompression applied to the lower half of the body. A series of experiments were conducted using the rotating chair with passive change of the subject's body position in space, while another series of experiments were carried out under conditions of weightlessness in a flying laboratory on a Keplerian trajectory. Ground-based decompression tests revealed different feelings of head tilts, whereas flight decompression tests disclosed that weightlessness did not result in subjective feeling of transformation of body position in space. The findings support the hypothesis about the influence of blood perfusion of individual vascular regions, particularly the brain, on the functional condition of the space analyzer in man. S.D.

A77-11465 # **Responses of external respiration to +8 Gx overload for different training level of testees (Reaktsii vneshnego dykhaniia na neregruzku +8 Gx pri razlichnom urovne trenirovannosti ispytuemykh).** Iu. N. Kamenskii and E. B. Shul'zhenko. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 83-85. 12 refs. In Russian.

Pneumotachographic and gas exchange experiments were conducted on acceleration-trained and acceleration-untrained male subjects aged 20-40 yr to study the response of external respiration on a 8 Gx acceleration under heat moving toward back conditions for 60 sec. Both groups are found to exhibit identical subjective feelings of acceleration, breathing difficulty, general fatigue, and unidirectional and significant changes in ventilation and gas exchange compared to initial levels (p less than 0.05). It is shown that the function of external respiration is less effective in the untrained than in the trained subjects, due to lack of training of the untrained subjects on the centrifuge. S.D.

A77-11466 # **Genesis of vestibulo-vegetative disorders under weightlessness conditions (O geneze vestibulo-vegetativnykh rasstroistv v usloviiakh nevesomosti).** M. B. Zabutyi. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, Sept.-Oct. 1976, p. 85-88. 11 refs. In Russian.

The paper presents a critical discussion of the investigation of Brianov et al. (1975) who, based on several examples from clinical practice and experimental studies on cosmonauts, have reduced the whole genesis of vestibular disorders in weightlessness state to hemodynamic changes in the blood vessel pool of the brain. Evidence to refute the interpretation of many examples presented by these investigators is provided. It is suggested to rely on the concept that the syndrome of motion sickness arising during weightlessness and other motion-related diseases is based on the functional disorders occurring in the vestibular system. Factors affecting the disorder of the vestibular system are identified. S.D.

A77-11475 **Lack of effect of naloxone on pain perception in humans.** A. El-Sobky (Friern Hospital, London, England), P. D. Wall (University College, London, England), and J. O. Dostrovsky. *Nature,* vol. 263, Oct. 28, 1976, p. 783, 784. 18 refs. Research supported by the Medical Research Council.

Results are reported for experiments which demonstrate that the perception of experimentally induced pain in normal human subjects is not altered by the administration of the opiate antagonist, naloxone. Five healthy adult subjects were tested on three different days for effects of intravenous injection of 0.4 to 0.8 mg of naloxone or a saline placebo; pain was induced by delivering incrementally increasing electric shocks. Evaluations are made of threshold for sensation, pain threshold, severe-pain threshold, and maximal-tolerance current levels. The results show that naloxone has no significant effect on any of these four parameters. The lack of effect on pain perception is taken to suggest that under the experimental conditions employed, there is no significant ongoing release of a morphine-like compound within the brain. F.G.M.

A77-11476 **Photoreceptor membrane carbohydrate on the intradiscal surface of retinal rod disks.** P. Rohlich (Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Nature*, vol. 263, Oct. 28, 1976, p. 789-791. 24 refs.

An electron-microscopic histochemical study of the carbohydrate component of the photoreceptor membrane in frog retinas is presented. Two types of investigations were performed. First, aldehyde-fixed frog retinas were embedded in different materials, and electron-microscopic histochemical reactions for carbohydrate detection were carried out on thin sections. Second, ferritin-labelled concanavalin A was used to detect lectin-binding carbohydrates on the photoreceptor membrane. The results of both investigations show the presence of a carbohydrate layer at the intradiskal surface of frog retinal rods. Assuming that rhodopsin is reponsible for the carbohydrate reaction, it is concluded that the carbohydrate component of rhodopsin must be localized at the intradiskal surface of the disk membrane. F.G.M.

A77-11480 **The puzzle of the Martian soil.** R. S. Lewis. *Spaceflight*, vol. 18, Nov. 1976, p. 391-395.

The puzzle presented by the Viking 1 life detection experiments is discussed. It is not yet decided whether the reactions from treated soil samples in these experiments are biological or some unearthly, peculiarly Martian form of inorganic soil chemistry. The communications problem of Viking 2 associated with gyroscope failure on the Orbiter is examined. Three biological experiments are described: the gas chromatograph mass spectrometer and X-ray fluorescence spectrometer experiment, the gas exchange experiment, and the pyrolytic release or carbon assimilation experiment. A number of Viking 1 and 2 photographs are presented. B.J.

A77-11546 **Shuttle crew training revision needed.** *Aviation Week and Space Technology*, vol. 105, Nov. 8, 1976, p. 124, 125, 127.

Orbiter personnel training and human engineering of Orbiter facilities are dealt with. Simulators and training facilities, training schedules, ranges of anthropometric measurements for personnel, sleeping accommodations, personal toilet and galley and waste management systems, and restraint systems for zero-g performance are described briefly. Affirmative action with provisions for training minorities and women for Space Shuttle service dictate extension of the anthropometric range of equipment and instrument designs to accommodate average measurements of women personnel. Standardization of mission phases, streamlining of mission planning, working advanced training into schedules, and combined vs separate training of flight crew and payload specialists are weighed. R.D.V.

A77-11550 # **Life beyond the earth.** C. Ponnamperuma (Maryland, University, College Park, Md.). *Astronautics and Aeronautics*, vol. 14, Nov. 1976, p. 50-55.

The various aspects of the 'search for life' that is currently being carried out by Viking I and II are discussed, and the design of the Viking biology package is examined. Laboratory experiments being conducted around the world in an attempt to unravel the perplexing results of the Viking biology experiments (gas-exchange (GEX); labelled release (LR); and pyrolytic release (PR)) are reviewed. Some aspects of searching for intelligent life elsewhere in the universe are examined. V.P.

A77-11589 # **The possibilities of Spacelab for solving medical problems.** W. Hepp (Dornier System GmbH, Friedrichshafen, West Germany). *British Interplanetary Society, Journal*, vol. 29, Nov. 1976, p. 755-759.

Manned space missions have shown that weightlessness is the most important factor influencing living organisms. This factor alone justifies biomedical experiments aboard Spacelab. Measurements during past space missions have demonstrated many reactions of organisms, including redistribution of blood and body fluids, hormonal imbalance, loss of musculo-skeletal volume, decrease of metabolic rate, deformation of organs, disturbance of vestibular system and orientation, disturbance of biological rhythm. Proposals for new medical investigations are concerned with the reaction of the cardiovascular system, the disturbance of mineral balance, renal and pulmonary functions, osteogenesis, the etiology of motion sickness, and the disturbance of biological rhythm. Examples of the instrumentation of a biomedical laboratory are given. (Author)

A77-11708 **Abnormal patterns and physiological variations in magnetocardiograms.** D. Cohen (MIT, Cambridge, Mass.), E. Lepeschkin (Vermont, University, Burlington, Vt.), H. Hosaka (Nihon Kohden Kogyo Co., Ltd., Tokyo, Japan), B. F. Massell (Children's Hospital, Boston, Mass.), and G. Myers (Harvard University, Boston, Mass.). *Journal of Electrocardiology*, vol. 9, Oct. 1976, p. 398-409. 10 refs. Research supported by the American Heart Association; NSF Grant No. C-670-2; Grants No. PHS-HL-01486; No. NIH-HL-14209.

Magnetocardiograms (MCGs) of six subjects with representative cardiac abnormalities and of one well-studied normal subject are compared with the 12-lead ECGs and VCGs of these subjects. The MCGs are recordings of the component of the magnetic vector which is normal to the skin, measured across the chest on a 5 cm x 5 cm grid; an example is also presented of a sequence of instantaneous MCG maps. The heart abnormalities include myocardial infarction, angina pectoris, intraventricular conduction disturbances, and ventricular hypertrophy. The various MCG maps of the normal subject show MCG changes as a result of changes in body morphology (loss of weight), changes in the subject's position during recording, and changes as a result of exercise. They are presented as a basis for understanding some of the variability of MCG maps. (Author)

A77-11709 **Magnetic field produced by a current dipole.** D. Cohen (MIT, Cambridge, Mass.) and H. Hosaka (Nihon Kohden Kogyo Co., Ltd., Tokyo, Japan). *Journal of Electrocardiology*, vol. 9, Oct. 1976, p. 409-417. 13 refs.

The paper examines the nature of magnetocardiograms (MCG) by studying the basic element used in models which simulate the current sources in the heart: the current dipole. It is shown that the magnetic field of the dipole is made up of two parts: the contribution by the dipole element itself, and the contribution by the current generated in the volume conductor by the dipole. A theoretical analysis of the current dipole of the special shapes of the volume conductor is applied to the magnetic forward and inverse problems of magnetocardiography. The zero to Bz contribution of the magnetic field (the component which is normal to the boundary of the volume conductor) is used in developing a method for estimating the presence of those dipole combinations which produce a suppressed surface potential. B.J.

A77-11710 **The effect of the torso boundaries on the magnetocardiogram.** H. Hosaka (Nihon Kohden Kogyo Co., Ltd., Tokyo, Japan), D. Cohen, B. N. Cuffin (MIT, Cambridge, Mass.), and B. M. Horacek (Dalhousie University, Halifax, Canada). *Journal of Electrocardiology*, vol. 9, Oct. 1976, p. 418-425. 11 refs.

The magnetic field produced by a current dipole is made up of two parts: the field from the dipole element, and from the current generated by the dipole in the volume conductor. The volume conductor in the form of the human torso is investigated by computer simulation. Three different heart-torso models are used. The contributions to the normal field component (Bn) by the volume current (via the boundaries) and by the heart dipoles are computed. For Bn the three models yield a ratio of boundary to dipole contribution in the same range, with 0.28 as the average. The arrow map, developed previously to display Bn over special surfaces, is shown to be valid for the human torso, for visually estimating the heart dipoles. (Author)

A77-11711 **Visual determination of generators of the magnetocardiogram.** H. Hosaka (Nihon Kohden Kogyo Co., Ltd., Tokyo, Japan) and D. Cohen (MIT, Cambridge, Mass.). *Journal of Electrocardiology*, vol. 9, Oct. 1976, p. 426-432. 5 refs.

It was previously shown that Bn, the component of the heart's magnetic field which is normal to the chest, is largely produced directly by the generators in the heart, and that the distribution of Bn across the chest could be displayed as an arrow map which visually reveals the underlying dipole sources. This paper presents arrow maps of one abnormal and two normal heart subjects for the purpose of demonstrating that the generators of the magnetocardiogram can be coarsely estimated by visual inspection of these maps. B.J.

A77-11749 **Beyond averaging - The use of discriminant functions to recognize event related potentials elicited by single auditory stimuli.** K. C. Squires and E. Donchin (Illinois, University, Champaign, Ill.). *Electroencephalography and Clinical Neurophysiology*, vol. 41, Nov. 1976, p. 449-459. 16 refs. Grant No. DAHC15-73-C-0318.

A test of the stepwise discriminant analysis procedure for assessing single-trial event-related cortical potentials elicited in the course of EEG examination is described. Discriminant functions were constructed from a data base composed of event-related potentials from 16 subjects who were presented trains of loud and soft tones. (Loud tones occurred randomly on 10% of the trials.) Subjects either counted the loud stimuli or solved a hidden word puzzle. Various discriminant functions at three electrode sites were obtained to examine the feasibility of performing pairwise discriminations between events which are defined by this procedure. B.J.

A77-11750 **Activity of neuronal populations of human subcortical structures during sleep.** N. I. Moiseeva and Z. A. Aleksanian (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Electroencephalography and Clinical Neurophysiology*, vol. 41, Nov. 1976, p. 467-475. 32 refs.

Multi-unit activity of neuronal populations of 14 subcortical structures was studied during drowsiness and sleep in patients with depth electrodes implanted in the brain for therapeutic purposes. The mean firing rate of the multi-unit activity was found to decrease during slow-wave sleep in each cycle, and multi-unit activity was found to increase during paradoxical sleep. In successive sleep cycles, the mean firing rate increased somewhat from cycle to cycle during slow sleep, and increased considerably during wakefulness after a sufficiently long sleep as compared with the initial background values. Changes of the firing rate in separate structures may develop a few seconds prior to the clinical display of the REM phase. B.J.

A77-11892 **Intracellular buffering of heart and skeletal muscles during the onset of hypercapnia.** J. A. Bettice (Case-Western-Reserve University, Cleveland, Ohio), B. C. Wang, and E. B. Brown, Jr. (Kansas, University, Kansas City, Kan.). *Respiration Physiology*, vol. 28, Oct. 1976, p. 89-97. 17 refs. Grants No. NIH-HL-12231; No. NIH-1-F22-HL-04000-01.

A77-11899 **Shuttle manipulator design reviewed.** *Aviation Week and Space Technology*, vol. 105, Nov. 1, 1976, p. 38, 39.

The paper deals with the Canadian-built remote manipulator system that will deploy and retrieve space shuttle payloads in orbit. The first manipulator flight is planned on the third shuttle orbital flight when the long-duration exposure facility is expected to be deployed. The manipulator system will be 50 ft long and have six degrees of freedom. The shoulder joint (the point which attaches to the orbiter payload bay about 7 ft aft of the main cabin bulkhead) will have pitch and yaw capability. The unit's elbow joint that connects the two boom sections will have a pitch capability, while the RMS wrist joint that joins the end effector will have pitch, roll, and yaw. Design capability is for maneuvering payloads on the order of 32,000 lb. Shuttle free-flying payload deployment simulations, currently under way, are discussed, along with some aspects of manipulator control. V.P.

A77-11997 **Primitive grain clumps and organic compounds in carbonaceous chondrites.** F. Hoyle and N. C. Wickramasinghe (University College, Cardiff, Wales). *Nature*, vol. 264, Nov. 4, 1976, p. 45, 46. 17 refs.

The paper proposes that physical conditions in prestellar molecular clouds favor the condensation of complex organic polymers, including amino acids, within a matrix of smaller refractory particles. It is shown that such composite grain clumps with dimensions exceeding 1 micron could be expelled along with gaseous material in protostellar cocoons, causing the widespread dispersal of biological activity in the Galaxy. It is argued that grain clumps of the type considered may be identified with micron-sized inclusions found in carbonaceous chondrites. It is suggested that large grain clumps of this type in a protoplanetary disk could also serve as accretion sites for smaller grains that condense within the disk, leading to the formation of planetesimals and, eventually, planets. F.G.M.

A77-11999 **Rivalrous texture stereograms.** J. E. W. Mayhew and J. P. Frisby (Sheffield, University, Sheffield, England). *Nature*, vol. 264, Nov. 4, 1976, p. 53-56. 5 refs.

The way in which disparity information contained in rivalrous-texture stereograms is extracted from the two retinal images to produce stereoptic vision is investigated. A test is conducted of the hypothesis that the disparity information carried by two monocular objects embedded in random textures might be extracted by point-for-point matching in a 'stereopsis channel' tuned to low spatial frequencies while other stereopsis channels tuned to higher spatial frequencies are in states of rivalry. The results show that stereopsis can be obtained from rivalrous-texture stereograms only if there is spectral overlap in the two halves of the stereogram, irrespective of the monocular visibility of the texture contours themselves. It is concluded that stereopsis in rivalrous-texture stereograms can be explained by spatial-frequency-tuned stereopsis channels without any need to involve more complex stereopsis mechanisms incorporating monocular-object recognition. F.G.M.

A77-12244 **A mathematical model of the human temperature regulatory system - Transient cold exposure response.** R. G. Gordon (California Polytechnic State University, San Luis Obispo, Calif.), R. B. Roemer, and S. M. Horvath (California, University, Santa Barbara, Calif.). *IEEE Transactions on Biomedical Engineering*, vol. BME-23, Nov. 1976, p. 434-444. 50 refs. Research supported by the University of California; Grant No. AF-AFOSR-73-2455.

A77-12245 **Determination of oxygen tension by measurement of net charge transport.** G. L. Zick (Washington, University, Seattle, Wash.). *IEEE Transactions on Biomedical Engineering*, vol. BME-23, Nov. 1976, p. 472-477. 13 refs.

The paper describes the design, principles of operation, and capabilities of a pulsed amperometric-electrode measurement system for determination of oxygen tension in blood. The system consists of a gold cathode, Ag-AgCl anode, pulsed differential electrometer with dynamic gain, and a digital data acquisition unit. The technique is shown to effectively evaluate the difference in charge transport that occurs during the polarization potential, so that it is possible to measure net charge transport which is proportional to the oxygen tension of whole blood as early as 1 msec after application of the polarization pulse. The measurement technique also stabilizes the inherent electrode drift. Other advantages are elimination of flow sensitivity and inadequate response time. S.D.

A77-12288 **Relations of the hydroxyproline concentration in the lungs to the lung weight, the silica and aluminum concentrations, and the dust dose, after repeated intratracheal coal dust application in a long-term test with rats (Beziehungen der Oxiprolinkonzentration in Lungen zum Lungengewicht, zu Kieselsäure- und Aluminiumkonzentrationen sowie zur Staubdosis nach wiederholter intratrachealer Kohlenstaubapplikation im Langzeitversuch an Ratten).** W. Ehm (Rheinisch-Westfälische Technische Hochschule, Aachen, West Germany). *Staub-Reinhaltung der Luft*, vol. 36, Oct. 1976, p. 410-417. 71 refs. In German. Research supported by the Bergbau-Berufsgenossenschaft Bochum.

A77-12379 # **A system of remote utilization of a computer during the processing of biological data (Ob odnoi sisteme distantsionnogo ispol'zovaniia EVM pri obrabotke biologicheskoi informatsii).** Z. D. Zurabishvili, L. G. Kiknadze, and A. Sh. Chaduneli. In: Mathematical and technical cybernetics. Tiflis, Izdatel'stvo Metsniereba, 1975, p. 110-118. In Russian.

The paper considers the design of a computer system for the processing of biomedical data, with particular application to a laboratory of radiobiology. The computer is used to process EEG and ECG data, to calculate auto- and cross-correlation functions, to perform coherent and factor analyses, and to obtain regression curves. Block diagrams of the system are presented with particular attention given to remote interfacing of the computer with the bioinstrumentation. B.J.

A77-12381 # **Analysis of the problem of synchronizing the operation of different devices during the conversion and storage of digital electrocardiogram data (Analiz voprosa sinkhronizatsii raboty otdel'nykh ustroistv pri preobrazovanii i nakoplenii chislovoi informatsii elektrokardiogramm).** A. Sh. Chaduneli. In: Mathematical and technical cybernetics. Tiflis, Izdatel'stvo Metsniereba, 1975, p. 157-164. 5 refs. In Russian.

A77-12400 **Evidence of morphological and physiological transformation of mammalian cells by strong magnetic fields.** G. I. Malinin, V. K. Sharma, J. C. Houck (Children's Hospital, Washington, D.C.), W. D. Gregory, and L. Morelli (Georgetown University, Washington, D.C.). *Science*, vol. 194, Nov. 19, 1976, p. 844-846. 9 refs.

Cultures of L-929 and WI-38 cells, frozen to 4.2 K and exposed for 4 to 8 hours to 5000-oersted magnetic fields, were markedly inhibited in their growth as compared with controls. In cultures grown on cover slips, approximately 7 days after exposure, morphologically distinct cells emerged and were propagated from generation to generation; 3 weeks later, in flask cultures, contact inhibition was abolished. It is concluded that under certain experimental conditions, strong magnetic fields induce morphological and physiological transformations in target cells. (Author)

A77-12425 **Pulmonary hypertension.** Edited by J. Widimsky. Basel, S. Karger AG (Progress in Respiration Research. Volume 9), 1975. 328 p. $74.25.

The present collection of papers deals essentially with pulmonary hypertension in chronic obstructive bronchopulmonary disease with special attention to long-term studies, pulmonary hypertension at high altitudes, and pulmonary hypertension in left heart failure. Normal hemodynamic values of pulmonary circulation both at rest and during exercise are discussed. The promising aspects of long-term oxygen treatment of chronic pulmonary hypertension in chronic bronchitis as well as the role of left heart in chronic obstructive bronchopulmonary disease are examined. The reversibility of pulmonary vascular changes induced by permanent or intermittent high altitude is demonstrated along with the reversibility of right ventricular hypertrophy. New aspects of therapy of acute left heart failure in patients with acute myocardial infarction are stressed. Free communications are also included. S.D.

A77-12427 * **Distribution of control decisions in remote manipulation.** A. K. Bejczy (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Conference on Decision and Control, 6th, and Symposium on Adaptive Processes, 14th, Houston, Tex., December 10-12, 1975, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 81-91. 44 refs. Contract No. NAS7-100.

The particular characteristics of the problem of distributing control decisions between man and computer in remotely controlled manipulation are discussed. State of the art is reviewed from two viewpoints: (1) specifications of both control commands and control context of sensor signals the operator inputs to the manipulator control computer; (2) operations the manipulator control computer performs on operator commands and realtime sensor signals to control the manipulator for a specified task. JPL breadboard systems, system components, and control experiments are described related to the development and evaluation of manipulator control systems with capabilities of distributing control decisions between man and computer. (Author)

A77-12449 **A maximum likelihood approach for identifying human operator remnant in a tracking task.** D. W. Repperger and A. M. Junker (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Conference on Decision and Control, 6th, and Symposium on Adaptive Processes, 14th, Houston, Tex., December 10-12, 1975, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 534-540. 16 refs.

By applying a maximum likelihood approach to identification with empirical data from a tracking task, the output signal uncorrelated with the input signal (a definition of human operator remnant) can be determined. To obtain this remnant signal, a linear, stationary model describing the human is utilized. The innovations signal is computed from the difference in the empirical data and the model's output. The remnant can then be identified using the innovations sequence by computing the component of the output signal which is uncorrelated (or orthogonal) to the input signal. Data from a Roll Axis Tracking Simulator is analyzed and remnant is identified to two phases of tracking (with and without motion information). (Author)

STAR ENTRIES

N77-10241*# Connecticut Univ., Storrs.
THEORY OF ORTHODONTIC MOTIONS
Susan Pepe, W. Dennis Pepe (Conn. General Insurance Co.), and Alvin M. Strauss (Cincinnati Univ.) *In* NASA. Langley Res. Center Advan. in Eng. Sci., Vol. 1 1976 p 103-110 refs
Avail: NTIS HC A16/MF A01

Proceedings from a conference on engineering advances are presented, including materials science, fracture mechanics, and impact and vibration testing. The tensile strength and moisture transport of laminates are also discussed.

N77-10260*# Cincinnati Univ., Ohio.
BIODYNAMICS OF DEFORMABLE HUMAN BODY MOTION
Alvin M. Strauss and Ronald L. Huston *In* NASA. Langley Res. Center Advan. in Eng. Sci., Vol. 1 1976 p 309-318 refs
(Grants NSF ENG-75-21037; NSF ENG-75-06619)
Avail: NTIS HC A16/MF A01

Proceedings from a conference on engineering advances are presented, including materials science, fracture mechanics, and impact and vibration testing. The tensile strength and moisture transport of laminates are also discussed.

N77-10380*# Cincinnati Univ., Ohio.
EXPERIMENT DESIGN FOR PILOT IDENTIFICATION IN COMPENSATORY TRACKING TASKS
William R. Wells *In* NASA. Langley Res. Center Advan. in Eng. Sci., Vol. 4 1976 p 1721-1731 refs

Avail: NTIS HC A22/MF A01

The following areas of flight science are discussed in detail: (1) inviscid flow, (2) viscous flow, (3) aircraft aerodynamics, (4) fluid mechanics, (5) propulsion and combustion, and (6) flight dynamics and control.

N77-10776*# Transemantics, Inc., Washington, D.C.
MICROORGANISMS AS PRODUCERS OF HYDROGEN
Ye. N. Kondratyeva and I. N. Gogotov Washington NASA Aug. 1976 38 p refs Transl. into ENGLISH of Izv. Akad., ii Nauk SSSR, Ser. Biol. (USSR), no. 1, Jan. - Feb. 1976 p 69-86
(Contract NASw-2792)
(NASA-TT-F-17131) Avail: NTIS HC A03/MF A01 CSCL 06M

A review is presented of published data on micro-organisms capable of releasing molecular hydrogen, the condition and ways of its formation, the significance of this process, and the possibility of practical applications. Emphasis is placed on the release of hydrogen by chemotrophs such as obligate and faculative anaerobes, and by several species of phototrophs. Most data confirm that photoproduction of hydrogen by green algae is the result of decomposition of endogenic organic substances. The possibility of hydrogen formation is determined by the presence of a specific enzyme called hydrogenase. Author

N77-10777*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOPROCESSING IN SPACE
[1976] 15 p Prepared in cooperation with Boeing Co., Seattle
(Contract NAS9-13655)
(NASA-TM-X-74157) Avail: NTIS HC A02/MF A01 CSCL 06B

Space processing accomplishments onboard Skylab and Apollo Soyuz are reviewed. Possible applications of bioprocessing experiments to be carried on space shuttles and Spacelab are explored. A.H.

N77-10778# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
FIRST RESULTS OF AN INVESTIGATION OF THE EFFECTS OF MICROWAVE RADIATION WITH LOW POWER DENSITY ON THE BEHAVIOR OF RATS [EERSTE RESULTATEN VAN EEN ONDERZOEK NAAR DE EFFECTEN VAN MICROGOLFSTRALING MET LAGE VERMOGENSDICHTHEDEN OP HET GEDRAG VAN RATTEN]
B. Roberti, G. H. Heebels (Lab. for Electron. Develop. of the Armed Forces, Oegstgeest, Neth.), J. C. M. Hendricx (Lab. for Electron. Develop. of the Armed Forces, Oegstgeest, Neth.), and O. L. Wolthuis [1975] 14 p refs In DUTCH; ENGLISH summary
(MBL-1974-15; TDCK-64396) Avail: NTIS HC A02/MF A01

The effect of microwave radiation on the spontaneous motor activity of the male Wistar rat was investigated. Rats were exposed to microwaves of 10.7 GHz, continuous wave (CW), 3 GHz, CW or 3 GHz pulsed wave (PW) with power densities of about 1 mW/sq cm for 185 h. Moreover, a small number of rats was irradiated with 3 GHz, PW at 25 mW/sq cm for 17 days. Spontaneous activity was automatically measured and analyzed in 5 classes of movements of increasing amplitudes. After termination of the irradiation no differences were found between the irradiated rats and the non-irradiated controls. In the experiment with 3 GHz, PW at 25 mW/sq cm for 17 days, rats were used that had been pretrained to a constant top performance on a 2 m long runway. Their running-times were not influenced by the irradiation. No deleterious effects of the microwave irradiation have been found as yet. Author (ESA)

N77-10779# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
THE CONTRACTION PROLONGING ACTION OF 9-ANTHROIC ACID (ANCA) ON THE ISOLATED RAT DIAPHRAGM AND THE EFFECTS OF SOMAN ON THIS PHENOMENON
V. J. Nickolson and F. L. vanVelsen Sep. 1975 45 p refs In DUTCH; ENGLISH summary
(MBL-1975-25; TDCK-66841) Avail: NTIS HC A03/MF A01

The effects of the sodium salt of 9-anthracene carboxylic acid (9-anthroic acid; ANCA) and the cholinesterase inhibitor soman (3,3-dimethyl-2-butyl 2-methyl phosphonofluoridate) on the isolated rat phrenic nerve diaphragm preparation were investigated. Materials and methods used are presented: incubation and stimulation; influence of the stimulation frequency on the contraction prolonging effect of ANCA; direct stimulation; experiments in calcium-free medium; experiments with ouabaine; experiments with different chloride concentrations; and determination of the Na, K, Ca and Mg content. The results of the determination of the contraction prolonging effect of ANCA are presented and discussed. ESA

N77-10780* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THERMISTOR HOLDER FOR SKIN TEMPERATURE MEASUREMENTS Patent

John E. Greenleaf and Bill A. Williams, inventors (to NASA) Issued 5 Oct. 1976 4 p Filed 29 Sep. 1975 Supersedes N75-33642 (13 - 24, p 3077)

(NASA-Case-ARC-10855-1; US-Patent-3,983,753; US-Patent-Appl-SN-617612; US-Patent-Class-73-343R; US-Patent-Class-128-2H) Avail: US Patent Office CSCL 06B

An improved thermistor holder structure is disclosed which facilitates skin-temperature measurement. The device includes a cylindrical plastic housing with tab extensions that permits the apparatus to be held to a skin surface by suitable elastic members or the like. Ventilation openings are provided in the plastic housing to permit air circulation. An adjustable, resilient metal arm with a thermistor holding cup formed at one end is secured to the interior surface of the plastic housing such that the holding cup is located at the center of the housing. A thermistor temperature sensor is inserted into and held in the cup by interference fit.

Official Gazette of the U.S. Patent Office

N77-10782*# Transemantics, Inc., Washington, D.C.

EXPERIMENTS ABOARD BIOSATELLITES KOSMOS-690 AND KOSMOS-782

Yu. Grigoryev and A. Sedov Washington NASA Sep. 1976 8 p Transl. into ENGLISH from Med. Gazeta (USSR), 9 Apr. 1976 p 3

(NASA-TT-F-17215) Avail: NTIS HC A02/MF A01 CSCL 06R

An artificial source of irradiation was installed aboard the biosatellite Cosmos 690 for simulating the effect of solar flares on white rats. The bioblok microlaboratory was carried aboard the Cosmos 782 satellite. Bioblok consisted of a pair of identical units gathered in a single coordinate system of alternating layers of dielectric track detectors and biological objects enclosed in restraining plates. The experiment was conducted to study the biological effect of heavy ions of galactic cosmic irradiation. The objects used in the experiment were: Brachiopoda subclass eggs, yeast cell colonies, tobacco seeds, and Arabidopsis. Author

N77-10783*# Transemantics, Inc., Washington, D.C.

SECOND EXPEDITION OF THE SALYUT-4 ORBITAL STATION. CERTAIN RESULTS AND TASKS OF MEDICAL RESEARCH

O. G. Gazenko and A. D. Yegorov Washington NASA Oct. 1976 30 p Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (USSR), no. 4, Apr. 1976 p 25-36

(NASA-TT-F-17223) Avail: NTIS HC A03/MF A01 CSCL 06P

Effects of the Salyut 4 mission on the human organism and other medical problems which remain to be solved are discussed. Research in space medicine is being directed to: (1) perfection of prediction methods of a cosmonaut's possible functional state disorders in long-term flights; (2) further study of adaptation; (3) quantitative evaluation of the role of certain flight factors and the organism's response reactions; and (4) perfection of a method of applying preventive measures and developing new measures. Author

N77-10784# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

MUTAGENICITY TESTING OF SOME NITROFURAN DERIVATIVES AND SOME CHLORINATED HYDROCARBONS

I. E. Mattern Sep. 1975 18 p refs In DUTCH; ENGLISH summary

(MBL-1975-22; TDCK-66737) Avail: NTIS HC A02/MF A01

The mutagenicity of the nitrofuran derivatives nitrofurantoin, nitrofurazone, nifuroxine, 5-nitrofuraldehyde diacetate, and trans-2-(2-furyl)-3-(5-nitro-2-furyl) acrylamide (AF2) and of the chlorinated hydrocarbons pentachlorophenol dieldrin, 2,2'-dichlorodiethylether, trichloroethyl phosphate, and of the two PCB mixtures aroclor 1242 and 1254 was determined using the Ames test, using salmonella typhimurium or Escherichia coli bacteria. In decreasing order of potency 5, 1, 3 and 4 were mutagenic for Escherichia coli. All substances induced base pair substitution mutations. From the chlorohydrocarbons tested only 2,2'-dichlorodiethylether was mutagenic. Also the nitrofuran containing waste water of a pharmaceutical factory was tested and was found to induce mutations, even in a 10,000-fold dilution. ESA

N77-10785# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

THE FUNCTION OF THE GASTROINTESTINAL CHANNEL OF THE RAT DURING SHOCK [DE FUNCTIE VAN HET MAAG-DARMKANAAL VAN DE RAT IN SHOCK]

D. deJong, M. Wijnans, and P. vanEck 1975 29 p refs In DUTCH; ENGLISH summary

(MBL-1975-16; TDCK-66658) Avail: NTIS HC A03/MF A01

The reduction or postponement of shock by drinking salt-containing water was investigated. Rats were bled and by means of I-131 polyvinylpyrrolidon (PVP), which is little resorbed in the gastrointestinal channel, the influence of shock on transport from the stomach was established. The experiment was repeated with a labeled 0.9% NaCl solution. Results were compared with those of non-shocked animals. In severely shocked rats the salt fluid administered was retained to a considerable degree in the stomach, apparently due to atonia of the stomach wall. There also appeared to be atonia of the intestinal wall. ESA

N77-10786# Cleveland Clinic Foundation, Ohio. Dept. of Artificial Organs.

BIOLIZED LATEX POLYURETHANES Annual Report, 1 Dec. 1974 - 30 Nov. 1975

Y. Nose, G. Picha, H. Kambic, D. F. Gibbons, and R. Martin Mar. 1976 43 p refs

(Contract N01-HB-3-2914)

(PB-253085/5; NIH-N01-HB-3-2914-3) Avail: NTIS HC A03/MF A01 CSCL 06L

The potential use of latex polyurethanes (LPU) in the development of biolized materials was evaluated. Nine LPU's, including both polyester and polyether types, were studied in addition to Biomer as a control. The pure polymers, unbiolized, were optimized with respect to curing time and temperature. The initial areas of development of the LPU's were processing, mechanical performance, tensile properties, as determined, hydrolysis, histocompatibility, and hemocompatibility. The latex urethanes have been preliminarily screened, evaluated for feasibility, and are still in the process of being optimized. Six materials have been eliminated from the study while the three LPU's still under investigation were found capable of withstanding severe hydrolytic environment up to 15 days. Biolization was not found to significantly alter the histopathological response which seems to be controlled by the LPU. However, the LPU's as tested in the in vitro closed kinetic test cell, showed better performance than the Silastic control and all biolized LPU's showed significant improvement over the nonbiolized LPU's. GRA

N77-10787# Calspan Corp., Buffalo, N.Y.

INTERFACIAL BIOPHYSICS OF MATERIALS IN CONTACT WITH BLOOD Annual Report, 16 Jan. 1975 - 15 Jan. 1976

R. E. Baier, C. Akers, S. Perlmutter, V. L. Gott (Johns Hopkins Univ., Baltimore), and J. ORiordan (Johns Hopkins Univ. Baltimore) 1 Mar. 1976 110 p

(Contract HB-3-2953)

(PB-253117/6; CALSPAN-W06-EB-5307-M-18; NIH/NHLI-N01-HB-3-2953-2) Avail: NTIS HC A06/MF A01 CSCL 06L

The nature, sequence and severity of early adsorptive and cellular adhesive events were established at the boundary between blood and nonphysiologic materials proposed for blood contact applications in a variety of medically useful devices. Task 1 involves the production and analysis of interfacial layers of proteins and polypeptides. Task 2 is devoted to the in vivo evaluation of competing concepts of thromboresistance, mainly investigating low surface-free-energy and high surface-free-energy materials

in the canine vena cava ring test. Task 3 provides for characterization of the surface properties of biocompatible materials from 12 separate sources. GRA

N77-10788# General Electric Co., Schenectady, N.Y. Research and Development Center.
DEVELOPMENT AND EVALUATION OF AN ULTRASONIC IMAGING SYSTEM Annual Report, 15 Jun. 1975 - 15 Mar. 1976
Paul M. Griffen, Henry A. F. Rocha, Charles E. Thomas, and John R. M. Viertl 31 Mar. 1976 84 p refs
(PB-252561/6; SRD-76-035; NIH/NHLI-N01-HV-5-2966-1) Avail: NTIS HC A05/MF A01 CSCL 06L

Detection and characterization of atheroma requires much higher resolution than available in current ultrasonic imaging systems. The purpose was to implement laser shock excitation techniques for wideband acoustic generation and optimized electrostatic receivers for wideband acoustic detection. It was shown that very short acoustic pulses can be generated having useful energy in the 2 MHz to 20 MHz range. Electrostatic receivers were fabricated and tested which are as sensitive as a PZT crystal at or near their tuned frequency. Evaluation of a coupled laser shock excitation acoustic generator and an electrostatic receiver indicated that the useful acoustic range was 1 to 50 MHz. Iterative improvements are continuing. GRA

N77-10789# Michigan State Univ., East Lansing. Div. of Engineering Research.
INDUCED EM FIELD AND ABSORBED POWER DENSITY INSIDE HUMAN TORSOS BY 1 TO 500 MHz EM WAVES
Kun-Mu Chen and B. S. Guru Apr. 1976 184 p refs
(Grant NSF ENG-74-12603)
(PB-254247/0; TR-1) Avail: NTIS HC A09/MF A01 CSCL 06R

Numerical results on the internal EM field and absorbed power density inside a human torso induced by EM waves of frequencies ranging from 1 to 500 MHz and of both vertical and horizontal polarizations are presented. GRA

N77-10790*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SUBJECTIVE RESPONSE TO COMBINED NOISE AND VIBRATION DURING FLIGHT OF A LARGE TWIN-JET AIRPLANE
Sherman A. Clevenson Washington Oct. 1976 43 p refs
(NASA-TM-X-3406; L-10578) Avail: NTIS HC A03/MF A01 CSCL 05H

A NASA twin-jet airplane was used to obtain controlled noise and vibration environments during flight while obtaining subjective responses from 13 passenger-subjects (6 females and 7 males). Subjective ratings of overall comfort, comfort when considering only vibration, and comfort when considering only noise were obtained during times of different vibration and noise environments. Passenger-subjects were able to distinguish and rate noise better than vibration. In addition, there was a statistically significant difference in ratings of ride comfort due to both sex type and flight experience. Males rated flying discomfort much more severely than females when rating the overall ride and the ride when considering only the noise environment. Experienced passengers also rated the overall ride to be more uncomfortable than inexperienced passengers. Author

N77-10791*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NOISE AND VIBRATION RIDE COMFORT CRITERIA
Thomas K. Dempsey, Jack D. Leatherwood, and Sherman A. Clevenson Oct. 1976 25 p refs Presented at the 92d Acoustical Soc. of Am. Meeting, San Diego, Calif., 16-19 Nov. 1976
(NASA-TM-X-73975) Avail: NTIS HC A02/MF A01 CSCL 05H

Two of the most important factors, namely, vibration and noise, were studied to (1) determine whether composite or separate noise and vibration criteria are needed for the prediction of ride quality, (2) determine a noise correction for the previously-defined vibration criteria of the ride quality model, (3) assess whether these noise corrections depend on the nature of the vibration stimuli, i.e., deterministic as opposed to random, and (4) specify noise-vibration criteria for this combined environment. The stimuli for the study consisted of octave bands of noise centered at 500 or 2,000 Hz and vertical vibrations composed of either 5 Hz sinusoidal vibration or random vibrations centered at 5 Hz and with a 5 Hz bandwidth. The noise stimuli were presented at levels ranging from ambient to 95 dB(A) and the vibrations at levels ranging from 0.02 to 0.13g rms. Author

N77-10792*# Minnesota Univ., St. Paul. Dept. of Food Science and Nutrition.
STORAGE STABILITY AND IMPROVEMENT OF INTERMEDIATE MOISTURE FOODS, PHASE 3 Final Report, Aug. 1974 - Aug. 1975
T. P. Labuza 1975 386 p refs
(Contract NAS9-12560)
(NASA-CR-151004) Avail: NTIS HC A17/MF A01 CSCL 06H

Methods were determined for the improvement of shelf-life stability of intermediate moisture foods (IMF). Microbial challenge studies showed that protection against molds and Staphylococcus aureus could be achieved by a combination of antimicrobial agents, humectants and food acids. Potassium sorbate and propylene glycol gave the best results. It was also confirmed that the maximum in heat resistance shown by vegetative pathogens at intermediate water activities also cocurred in a solid food. Glycols and sorbitol both achieve browning inhibition because of their action as a medium for reaction and effect on viscosity of the adsorbed phase. Chemical availability results showed rapid lysine loss before visual discoloration occurred. This is being confirmed with a biological test using Tetrahymena pyriformis W. Accelerated temperature tests show that effectiveness of food antioxidants against rancidity development can be predicted; however, the protection factor changes with temperature. BHA was found to be the best antioxidant for iron catalyzed oxidation. Author

N77-10793*# Decision Science, Inc., San Diego, Calif.
A COMPUTER PROGRAM FOR THE USE OF SENSITIVITY ANALYSIS IN DISPLAY EVALUATION
Michael L. Mout and George H. Burgin 1976 72 p refs
(Contract NAS1-13734)
(NASA-CR-145060) Avail: NTIS HC A04/MF A01 CSCL 05E

A description is provided of the Display Evaluation computer program, some results of this program and comparison of these results with a simple experiment. A detailed description of the experiment and data analysis are also included. Author

N77-10794# Aerojet Nuclear Co., Idaho Falls, Idaho.
HUMAN FACTORS IN DESIGN
M. G. Bullock and R. J. Nertney Feb. 1976 138 p
(Contract E(10-1)-1375)
(ERDA-76-45) Avail: NTIS HC A07/MF A01

Human factors is a subject which is becoming of greater importance to the equipment designer. One reason is the increasing need for high reliability systems. Total reliability is dependent upon both the basic hardware reliability built into the design and the way that the human operator manipulates and uses the equipment. It is pointed out that a higher degree of responsibility for use and misuse implies that human factors are of more importance in the commercial design processes now than in the days when liability was more completely limited to product mechanical defects. This, in turn, means that the contemporary design engineer must have a greater knowledge of human factors than has been required in the past if he is to keep pace with the times. Author (ERA)

N77-10795# Kaman Sciences Corp., Colorado Springs, Colo.
A SOLID STATE DIGITAL DATA RECORDER FOR MONITORING ANTHROPOMORPHIC DUMMY IMPACT ENVIRONMENTS Final Report
Randolph J. Wolf May 1976 73 p refs
(Contract DOT-HS-4-00927)
(PB-254036/7; K-76-28U(R); DOT-HS-801-907) Avail: NTIS HC A04/MF A01 CSCL 13L

A solid state digital data recorder was developed for use in monitoring anthropomorphic dummy impact environments. The recorder was designed to be a very general miniature data acquisition system and was mounted in the pelvic assembly of a 50th percentile anthropomorphic dummy. An eight channel system was evaluated in a sled test series simulating a 30 mph vehicle-barrier impact. The dummy/recorder system was also evaluated in five vehicle collisions. During these tests the system successfully captured and stored impact information on all thirteen collisions in which it participated. GRA

N77-10796# National Inst. for Occupational Safety and Health, Morgantown, W.Va. Testing and Certification Lab.
DETERMINATION OF FACEPLATE CARBON-DIOXIDE CONCENTRATION LEVELS OF SELF-CONTAINED BREATHING APPARATUS
Samuel L. Terry Nov. 1975 24 p refs
(PB-252695/2; NIOSH/TC/R-003) Avail: NTIS HC A02/MF A01 CSCL 06K

While an individual is wearing a self-contained breathing apparatus, he is exposed to various concentration levels of expired carbon dioxide. These levels adversely affect the user's behavior and the respirators performance. Because of the variability among test subjects, this procedure has been standardized to a machine-test method using a breathing machine with a sedentary cam which operates at 14.5 respirations per minute with a minute volume of 10.5 liters. A 5% air carbon dioxide mixture is fed into the facepiece during exhalation and the average exposure level during inhalation is calculated. Experimental design limits this method to breathing apparatus with less than 1100 cc of effective dead-air space. The standard deviation of CO2 concentrations obtained by this method is less than 0.1% CO2 at a 95% confidence level. GRA

N77-10797# National Inst. for Occupational Safety and Health, Morgantown, W.Va. Testing and Certification Lab.
PROCEDURE FOR CONTINUOUS-FLOW RESPIRATOR FLOWRATE DETERMINATION
Steven W. Lenhart Nov. 1975 20 p refs
(PB-252694/5; NIOSH/TC/R-004) Avail: NTIS HC A02/MF A01 CSCL 06K

The test procedure was prepared as a guide to a method of determining the volume of air delivered by a continuous flow supplied-air respirator. The method has the advantage that the test results can be documented on recorder paper. The respiratory inlet covering of a supplied-air system is placed in a container with an outlet; the outlet of the container is connected to a pneumotachometer and pressure transducer. Flow rates delivered by the respiratory inlet covering at specified pressures and air supply hose lengths are recorded and determined from a graph prepared during pneumotachometer calibration. GRA

N77-10798# National Inst. for Occupational Safety and Health, Morgantown, W.Va. Testing and Certification.
PROCEDURE FOR TESTING STRENGTH OF HOSE AND COUPLINGS
Steven W. Lenhart Feb. 1976 18 p ref
(PB-252696/0; NIOSH/TC/R-006) Avail: NTIS HC A02/MF A01 CSCL 06K

A procedure was developed for testing the strength of hose and couplings of supplied air respirators. Hose and couplings used with Types A, AE, B, and BE respirators are tested with a pull of 113 kilograms for five minutes. Hose and couplings used with Types C and CE respirators are tested with a pull of 45 kilograms for five minutes and also subjected to an internal air pressure. GRA

N77-10799*# Joint Publications Research Service, Arlington, Va.
ON THE POSSIBLE UNIQUENESS OF INTELLIGENT LIFE IN THE UNIVERSE
I. S. Shklovskiy Washington NASA Oct. 1976 19 p Transl. into ENGLISH of Report PR-262, Academy of Sciences USSR, Inst. of Space Res., Moscow, 1976 p 1-30
(NASA Order W-13183)
(NASA-TT-F-17247) Avail: NTIS HC A02/MF A01 CSCL 03C

The modern conception of an expanding universe rejects theories of cosmic wonders, transformation of matter, or superintelligent cosmic factors as sources of intelligent life on earth. Life emerged on earth and became intelligent as the result of an extremely rare combination of improbable circumstances. The expansion of intelligent life in the universe will be accomplished by the establishment of artificial biospheres orbiting the moon or stationed in galaxies. Communications between these space colonies will rely on computer technology and radio astronomy. A.H.

N77-11639# Institut Franco-Allemand de Recherches, St. Louis (France).
INFLUENCE OF THE PEAK PRESSURE AND DURATION OF IMPULSE NOISE (GUN FIRE) ON THE HEARING OF THE GUINEA PIG [INFLUENCE DE LA PRESSION DE CRETE ET DE LA DUREE D'UN BRUIT IMPULSIF (BRUIT D'ARME) SUR L'APPAREIL AUDITIF DU COBAYE]
A. Dancer, R. Franke, G. Baillet, P. Vassout, and F. Devnere 27 Mar. 1975 35 p refs In FRENCH
(Contract DRME-74/024)
(ISL-R-109/75) Avail: NTIS HC A03/MF A01

The influence of peak pressure and the duration of impulse noise (gunfire type) was investigated in guinea pigs. The experimental setup used is described. Results from audiometric techniques based on the Preyer reflex and on the recording of cochlea potentials have evidenced the following factors: the evolution of the auditory sensitivity recuperation is of the 10 log t form; the importance of auditory fatigue seems related to the noise peak pressure according to 40 log delta p; and the auditory loss increases according to 20 log delta p. The increase of noise duration has no effect on auditory losses. ESA

N77-11640# Institut Franco-Allemand de Recherches, St. Louis (France).
INFLUENCE OF A PRECURSOR NOISE ON THE GLOBAL ACTION POTENTIAL CONSECUTIVE TO AN IMPULSE NOISE IN THE GUINEA PIG [INFLUENCE D'UN BRUIT PRECURSEUR SUR LE POTENTIEL D'ACTION GLOBAL CONSECUTIF A UN BRUIT IMPULSIF CHEZ LE COBAYE]
R. Franke and A. Dancer 22 Apr. 1975 26 p refs In FRENCH
(ISL-R-115/75) Avail: NTIS HC A03/MF A01

The inhibitive effect of a precursor noise in Guinea pigs was investigated studying the global action cochlean potential in order to reduce the stress (startle) provoked by the impulse noise. Experimental results show that for a given impulse noise (0.5 mbar overpressure, 2 ms duration) a precursor noise consisting of a click identical to the impulse noise, but of reduced amplitude, provokes a 33% weakening of the global action potential. In addition, a precursor noise consisting of a gust of white noise with maximum pressure (100 dB) at impulse noise incidence provokes a 70% weakening of the global action potential. The latter effect can be strengthened by a masking effect. ESA

N77-11641# Institut Franco-Allemand de Recherches, St. Louis (France).
STUDY OF METABOLIC RESPONSE VARIATION TO AN ACOUSTIC AGGRESSION [ETUDE DE LA VARIATION DE LA REPONSE METABOLIQUE A UNE AGRESSION D'ORIGINE ACOUSTIQUE]

P. Vassout and F. Devriere 29 May 1975 34 p refs In FRENCH
(ISL-R-120/75) Avail: NTIS HC A03/MF A01

The metabolic response of rats to an acoustic variation was investigated using a noise generator simulating sonic boom waves of N profiles. The operational conditions and experimental setup are presented. Experimental results including the dosage of blood plasma potassium, and glucose, as well as the dosage of catecholamines in rat urine after exposure to N acoustic waves, are discussed. A relation was found between the recovery time to return to base metabolism level and the peak pressure. In addition, isoeffect curves displaying peak pressure and exposure time versus the excretion of urine catecholamine were established. ESA

N77-11642# North Carolina Univ., Chapel Hill. Dept. of Bacteriology.
VIRION AGGREGATION AND DISINFECTION OF WATER VIRUSES BY BROMINE Final Report, Apr. 1974 - May 1975
D. Gordon Sharp May 1976 45 p refs
(Contract EPA-R-802946)
(PB-253087/1; EPA-600/2-76-163) Avail: NTIS HC A03/MF A01 CSCL 06M

Direct evidence is provided for the kind and degree of aggregation that was present among the virions that were treated with bromine as well as the PFU titers of the starters and the survivors. A dynamic system, in which disinfectant exposure time intervals as low as 0.5 seconds was developed. Polio and reovirus preparations, containing essentially all single particles, as indicated by electron microscopy, were tested in this system. The results indicated that reovirus single particle suspensions were 30 times as sensitive to bromine as poliovirus single particle suspensions, both showing essentially first order reaction kinetics with disinfection rates of 3 log base 10 per second and 6 log base 10 units per minute, respectively. GRA

N77-11643# Naval Research Lab., Washington, D.C. Marine Biology and Biochemistry Branch.
AN EVALUATION OF A FUEL-SOLUBLE ORGANOBORON BIOCIDE FOR CONTROL OF SULFATE-REDUCING BACTERIA IN SHIPBOARD FUEL TANKS Interim Report
Dorothea E. Klemme and Rex A. Neihof Apr. 1976 13 p refs
(NRL Proj. G04-01A; SR0240201)
(AD-A024017; NRL-MR-3259) Avail: NTIS HC A02/MF A01 CSCL 21/4

A biocide composed of a mixture of two dioxaborinane derivatives has been evaluated in test-tube assays and in large-scale test systems simulating conditions in shipboard, seawater-displacement fuel tanks. A concentration of approximately 20,000 ppm in the water phase was required to control sulfate-reducing bacteria of marine origin in a mixed population of microorganisms. It is not likely that this concentration can be attained in the relatively large volumes of water present in water-displacement fuel tanks by partitioning from a feasible concentration in the fuel phase. A preferable alternative for controlling microorganisms in water-displacement fuel tanks is the addition directly to the water phase of one of several previously evaluated water-soluble, fuel-insoluble biocides known to be effective at concentrations of 50 to 100 ppm.
Author (GRA)

N77-11644# Advisory Group for Aerospace Research and Development, Paris (France).
THE PATHOPHYSIOLOGY OF HIGH SUSTAINED +G SUB z ACCELERATION, LIMITATION TO AIR COMBAT MANOEUVERING AND THE USE OF CENTRIFUGES IN PERFORMANCE TRAINING
Neville P. Clarke, ed. (Texas A and M Univ., College Station) and Sidney D. Leverett, Jr., ed. (School of Aerospace Med.) Oct. 1976 77 p refs Papers presented at the Aerospace Med. Panel Specialists' Meeting, Copenhagen, 5-9 Apr. 1976
(AGARD-CP-189) Avail: NTIS HC A05/MF A01

The risk of significant cardiovascular change to a tactical fighter pilot from exposure to aerial combat accelerations such as those postulated for new high performance aircraft is investigated. Miniature swine were used as animal models to study the effects of high sustained acceleration. The seatback angle was assessed in relation to the psycho-physiological and physio-chemical changes in the human body. The utilization of the human centrifuge for training military pilots for air combat maneuvering +Gz stress is covered including the stress response and stress tolerance during the maneuvers. Centrifuge training improves the pilot's ability to effectively perform in the high G environment. For individual titles, see N77-11645 through N77-11653.

N77-11645# School of Aerospace Medicine, Brooks AFB, Tex.
CHANGES IN CLINICAL CARDIOLOGIC MEASUREMENTS ASSOCIATED WITH HIGH +G SUB z STRESS
Kent K. Gillingham and Phelps P. Crump *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 9 p refs

Avail: NTIS HC A05/MF A01

Because of reports of subendocardial hemorrhage and myofibrillar degeneration in animals exposed to sustained high G loads, questions have been raised regarding the safety of exposing pilots and human subjects to the similar G-stress levels likely to be encountered in the new high performance fighter aircraft. Noninvasive clinical cardiologic data, including ECGs, vectorcardiograms, systolic time intervals, and maximal treadmill stress tests, were obtained from two groups of subjects before and at several times after exposure to high-G stress. The group exposed to the greater G stress developed moderate cutaneous petechiasis and had other minor physical findings after the G stress, but showed few significant changes in cardiologic data: serum total CPK and LDH levels rose, and preejection period shortened at 48 h poststress. The group exposed to the lesser G stress had no symptoms following the G stress, but the vectorcardiograms revealed transient T-loop angle changes, and preejection period measured at one week poststress was significantly decreased. Because the serum enzyme changes were noncardiac in origin, and because the few other changes were not in a direction indicative of cardiac damage, the G stresses imposed were not significantly injurious. Author

N77-11646# School of Aerospace Medicine, Brooks AFB, Tex.
VENTRICULAR PATHOLOGY IN SWINE AT HIGH SUSTAINED +G SUB z
William F. MacKenzie and Russell R. Burton *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 3 p refs

Avail: NTIS HC A05/MF A01

Study of miniature swine has shown two distinct types of cardiac pathology as the result of exposure to HSGz. Grossly visible endocardial hemorrhage of varying degrees of severity occur consistently. In severe cases damage to Purkinje fibers is adequate to explain some of the ECG changes that have been found. A stress myocardiopathy is also found characterized by randomly distributed single or grouped, degenerate and dead muscle fibers surrounded by normal appearing fibers. Electron microscopically the lesion is characterized by profound changes in the contractile myofibrils known as myofibrillar degeneration. These changes have also been found in Purkinje fibers. It appears that the subendocardial hemorrhage is related to the combination of tachycardia, strong contractions (positive inotropism), and a hypovolemic ventricle. The stress myocardiopathy has a distinctly different and complex etiology. The ultrastructural lesions are not indicative of a primary hypoxic insult although hypoxia undoubtedly contributes. Author

N77-11647# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

PSYCHO-PHYSIOLOGICAL AND PHYSIO-CHEMICAL ASSESSMENT OF ACCELERATION INDUCED CHANGES IN HUMANS POSITIONED IN VARIOUS SEATBACK ANGLE CONFIGURATIONS

Victoria M. Voge, Harald J. VonBeckh, and Jeffry S. Bowman *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 9 p refs

Avail: NTIS HC A05/MF A01

A series of high-G tests were conducted on pilot/subjects using the multi-posture adjustable centrifuge test seat. An increase in human tolerance to sustained acceleration was demonstrated by employing several seat configurations. A significant increase in G tolerance was demonstrated with each increase in seatback angle. The position of the lower legs made no significant difference. Ten subjects between the ages of 20 and 44 with various body builds and G experience took part. All had passed the equivalent of a first class Navy flight physical, including complete spine X-rays and a determination of mental status. Some had previous G experience, either operational or in the human centrifuge, others did not. They were taking no significant medications at the time of the program, and were encouraged to eat normally, to get sufficient rest, and to avoid alcoholic beverages. The testing was carried out over a period of six weeks. The tests were carried out on the analog computer controlled, double gimbaled, dynamic flight simulator which consists of a human centrifuge having a fifty foot radius arm with the capability of attaining 40 G's in 7 seconds. S.M.

N77-11648# Royal Air Force Inst. of Aviation Medicine, Farnborough (England). Biodynamics Div.

CENTRIFUGE ASSESSMENT OF A RECLINING SEAT

David H. Glaister and Brian J. Lisher *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 8 p refs

Avail: NTIS HC A05/MF A01

A reclining seat has been built which would give a pilot a significant increase in acceleration tolerance whilst maintaining adequate forward vision. The effect of anti-G suit inflation has been investigated using three different pressure regimens, and positive pressure breathing (PPB) has been used to counter the added inspiratory effort which resulted from the considerable +G acceleration vector. The reclining seat alone gave an increase in tolerance of 1.4G when compared with a conventional seat; anti-G suit inflation afforded a further 1.0 to 1.6G; and PPB a further 1.0G. The combination led to relaxed greyout thresholds which averaged 7.4G in nine subjects. PPB produced a significant increase in vital capacity and restored the expiratory reserve volume to near normal levels. Subjectively, breathing became much easier. The closing volume of the lung was increased by acceleration, but was not significahtly affected by PPB. However, the increase in expiratory reserve volume with PPB should lead to less airway closure during tidal breathing, with a consequent increase in arterial oxygen levels and a decreased susceptibility to acceleration atelectasis. A seat in which a near supine position is adopted with respect to the G vector, when used in conjunction with an anti-G suit and positive pressure breathing, will result in a G tolerance which is in more accord with the performance of modern military aircraft. Author

N77-11649# Texas Univ., Galveston. Medical Branch.

CORONARY FLOW AND MYOCARDIAL BIOCHEMICAL RESPONSES TO HIGH SUSTAINED +G SUB z ACCELERATION

H. L. Stone, L. A. Sordahl, R. T. Dowell, J. N. Lindsey, and H. H. Erickson (School of Aerospace Med.) *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 8 p refs

Avail: NTIS HC A05/MF A01

In order to determine directly the myocardial response to +Gz acceleration, miniature swine were used as the experimental subjects. Some of the animals underwent surgical implantation of flow probes around the left circumflex coronary artery and a solid-state pressure transducer in the left ventricular cavity. All of the unanesthetized instrumented subjects were exposed to multiple +Gz acceleration levels for 60 to 120 seconds on a human centrifuge. Other subjects were exposed to a single acceleration level for 120 seconds and the hearts removed for biochemical analysis 1 to 2 hours later. Mitochondria and a lysosomal fraction were isolated from the left ventricle of all animals. Mitochondrial analysis of ADP:O ratio, respiratory control index (RCI), oxygen uptake (QO2) and calcium uptake were made. Free and bound acid phosphatase measurements were made in the lysosomal fraction. Left circumflex coronary artery flow (LCCF), heart rate (HR), left ventricular pressure (LVP), and the rate of rise of LVP (P), were measured in the instrumental animals. LVP and HR increased at all levels of acceleration studied while P increased initially but would decline later. LCCF decreased at all levels of acceleration stress. The mitochondrial ADP:O ratio and the RCI were unchanged but the QO2 and calcium uptake were increased at 9 +Gz. Free acid phosphatase increased at the same level of acceleration. Author

N77-11650# Ohio State Univ., Columbus. Coll. of Veterinary Medicine.

EFFECT OF SUSTAINED +G SUB z ACCELERATION ON CARDIAC OUTPUT AND FRACTIONATION OF CARDIAC OUTPUT IN AWAKE MINIATURE SWINE

Robert L. Hamlin and Sidney D. Leverett, Jr. (School of Aerospace Med.) *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 6 p refs

Avail: NTIS HC A05/MF A01

Effects of sustained +Gz on cardiac rhythm and output, and on fractionation of cardiac output (CO) were studied in 12 miniature swine centrifuged, while awake, to either +3Gz or +5Gz. CO and its subfractions were measured by injecting radiolabeled microspheres into the left atrium. Percentage of CO perfusing most organs fell precipitously during +5Gz; while that to the heart increased by twofold and that to the pelvic musculature remained nearly constant. At +3Gz percentage perfusing most organs fell, but that to heart and all skeletal muscle rose twofold. When regional flow decreased, it decreased most to the eye, and next to liver, cerebrum, and renal cortex. It decreased least to the midbrain, spleen, renal medulla and gut. The profound changes in CO and fractionation of CO in awake miniature swine subjected to +Gz may represent a summation of: reflex response, a waterfall effect, or deformation of nutrient arteries. Author

N77-11651# Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).

UTILIZATION OF HUMAN CENTRIFUGE FOR TRAINING MILITARY PILOTS IN THE EXECUTION OF PROTECTIVE STRAINING MANEUVERS

C. A. Ramacci and G. Meineri *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 3 p

Avail: NTIS HC A05/MF A01

The importance of the utilization of human centrifuges in the training of pilots in a rational execution of protective straining maneuvers is investigated. A group of young military pilots were submitted to +Gz for comparatively long durations. During the first centrifuge run the subjects were instructed to refrain from performing any voluntary straining maneuvers. Later, the same subjects were submitted to the same acceleration pattern, accompanied, this time, by the execution of the aforesaid straining maneuvers. Exposures to G were repeated. Changes in performance and in tolerance to G were evaluated by recording morphological changes of EXG and heart rate. Subjective feelings of pilots were recorded. Author

N77-11652# School of Aerospace Medicine, Brooks AFB, Tex. Biodynamics Branch.

THE USE OF A FIXED BASE SIMULATOR AS A TRAINING DEVICE FOR HIGH SUSTAINED OR ACM (AIR COMBAT MANEUVERING) +G SUB z STRESS

S. D. Leverett, Jr. and R. R. Burton *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 6 p refs

Avail: NTIS HC A05/MF A01

The imposition of +Gz stress on 92 highly experienced tactical air command fighter pilots is investigated. A typical class of 22 of these pilots had an average of 1351.66 fighter hours, and were 29.04 years of age (+ or - 0.54). In this same class of 22 fighter pilots they estimated the highest G that they had ever pulled was + or - 9.0 Gz for 6.4 sec. From this data it was apparent that fighter pilots flying the F4E Phantom jet did not pull high sustained G. Therefore a centrifuge program was initiated in order to train pilots at high sustained G and at ACM G. The profile used was as follows: (1) +3 Gz/15 sec - this was an orientation run in order to familiarize the pilot with the centrifuge environment; (2) +5 Gz/45 sec - this extended run was designed to enable the pilot to learn to pace his breathing and straining maneuver properly while being exposed to G sufficient to cause the anti-G suit to inflate; (3) a final ACM type profile that exposed him initially to +5 Gz/10 sec and then proceeded to +8 Gz/30 sec, decelerated to+5 Gz/10 sec and finally the centrifuge was brought to a halt. Under these conditions the 92 pilots' heart rate and rhythm was continuously monitored. Resting heart rate for this larger group prior to initiation of the run averaged 115.93 bpm. While the maximum heart rate at +8 Gz was 167.04 bpm in all instances using a students t-test, the P value is < .001 when the heart rates at any G level are compared to the pre-run control heart rates. All of the pilots were able to complete the proposed series of runs after receiving training by the centrifuge group without a loss of vision. Author

N77-11653# EEG Research Inst., Oslo (Norway).

STRESS RESPONSE AND STRESS TOLERANCE IN FIGHTER PILOTS DURING 6 G MANOEUVERS

C. W. Sem-Jacobsen *In* AGARD The Pathophysiol. of High Sustained +G sub z Acceleration, Limitation to Air Combat Manoeuvering and the Use of Centrifuges in Performance Training Oct. 1976 6 p

Avail: NTIS HC A05/MF A01

EEG and EKG have been monitored from 250 active fighter pilots flying combat training involving repeated 6 G turns and pullups. 50 students and 9 pilots have been monitored while riding in the back seat of two seater fighters going through the same manoeuvers. More than half of those pilots who had committed pilots error were unconscious with convulsions following 6 G manoeuvers. Gross EEG changes were seen in the EEG. Studies of the EKG and heart rate illustrates the cardio-vascular response. The well suited pilots had a quick response with increase of heart rate when needed to maintain adequate blood supply to the brain. The unsuited groups demonstrate a slow, unsufficient cardiac response leading to brain-anoxia unconsciousness and convulsion. The student pilots and the 9 pilots fell in the same two different categories indicating a basic difference in the functioning of the autonomic nervous system in these two groups. Author

N77-11654 Syracuse Univ., N.Y.

RECEPTOR CONTRIBUTIONS TO STEADY-STATE SENSITIVITY IN THE PERIPHERAL RETINA OF HUMAN OBSERVERS Ph.D. Thesis

John Miguel Martinez, II 1975 234 p

Avail: Univ. Microfilms Order No. 76-18539

Four psychophysical experiments are described which examine the role of interactions between signals from distinct receptor classes (rods and cones) in establishing steady-state sensitivity in the peripheral retina of the human eye. It is found that the threshold-raising effect of a steady light field is determined by reciprocal inhibitory interactions between the rod and cone receptor systems. Results indicate that the luminance difference threshold for colored light does not reflect the sensitivity of the receptor system that is most sensitive to the test wavelength employed. Rather, the data suggest that increment thresholds are determined by spatial and temporal summation of mutually inhibitory rod and cone signals. Interactions between receptor classes, however, are not found when absolute thresholds are measured. This suggests a qualitative difference between the neural processes mediating absolute and difference thresholds in the human eye. Dissert. Abstr.

N77-11655*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

POTENTIAL BIOMEDICAL APPLICATIONS OF ION BEAM TECHNOLOGY

Bruce A. Banks, Albert J. Weigand, Charles A. Babbush (Mt. Sinai Hospital, Cleveland), and Craig L. VanKampen (Case Western Reserve Univ.) 1976 20 p refs Presented at the twelfth AIAA Intern. Elec. Propulsion Conf., Key Biscayne, Fla., 15-17 Nov. 1976

(Grant GM-01090-14)

(NASA-TM-X-73512; E-8919) Avail: NTIS HC A02/MF A01 CSCL 06B

Electron bombardment ion thrusters used as ion sources have demonstrated a unique capability to vary the surface morphology of surgical implant materials. The microscopically rough surface texture produced by ion beam sputtering of these materials may result in improvements in the biological response and/or performance of implanted devices. Control of surface roughness may result in improved attachment of the implant to soft tissue, hard tissue, bone cement, or components deposited from blood. Potential biomedical applications of ion beam texturing discussed include: vascular prostheses, artificial heart pump diaphragms, pacemaker fixation, percutaneous connectors, orthopedic pros-thesis fixtion, and dental implants. Author

N77-11656# Johns Hopkins Univ., Baltimore, Md. Dept. of Biomedical Engineering.

PREDICTIVE MODEL OF THE AUDITORY PROCESS AS RELATED TO COMMUNICATION SYSTEMS Final Scientific Report, 1 Jan. 1971 - 31 Dec. 1975

M. B. Sachs 31 Dec. 1975 12 p refs Presented at the Spring Meeting of the Acoust. Soc. of Am., Baltimore, 1972 Submitted for publication

(Contract F44620-71-C-0024; AF Proj. 9777)

(AD-A024300; AFOSR-76-0457TR) Avail: NTIS HC A02/MF A01 CSCL 06/3

Responses from over 300 auditory nerve fibers have been systematically recorded. This is the first of neural coding in avian primary fibers. Recordings from single fibers in the cat auditory nerve under almost identical conditions were obtained for comparisons. Aside from the different ranges of characteristic frequencies the primary differences between avian and mammalian cochlear-nerve responses seem to be the higher rates of spontaneous and driven activity in the avian fibers. Further, the investigators developed a model for relating their psychophysical results in the framework of signal detection theory which accounts for the changes in psychophysical time constant with increasing fast-tone level. GRA

N77-11657# Missouri Univ., Columbia.

THE DEVELOPMENT OF CHRONIC INSERTABLE OXYGEN ELECTRODES Annual Report

Ronald E. Barr, Allen W. Hahn, and Kenneth G. Mayhan 25 Sep. 1975 26 p

(Contract DADA17-71-C-1104)

(AD-A024633) Avail: NTIS HC A03/MF A01 CSCL 06/2

An attempt is being made to develop long-term stability in oxygen sensing electrodes. Suitable designs of such electrodes would then be made for long-term insertion or implantation in tissue to chronically monitor oxygen tension. By employing

techniques of pretreatment and periodic anodization to a bare-tipped electrode in saline, repeatable electrode operating characteristics have been obtained for over six days. Investigations to obtain this type of response in biological media and in vivo conditions is being attempted, using a semipermeable membrane coating on the electrode tips to ward off poisoning. A long-term in vivo electrode implantation package has been developed for use in the in vivo oxygen electrode tests. Good oxygen response has been obtained for over 30 days with this system.
Author (GRA)

N77-11658# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
SAFE USE OF THE P-3 STROBE LAMP Final Report
Gloria Twine Chisum 22 Mar. 1976 10 p refs
(AD-A024036; NADC-76110-40) Avail: NTIS HC A02/MF A01 CSCL 06/18

Calculations of the retinal exposure from the P-3 strobe light and safe exposure levels have been made. Safe separation distances and safe use procedures are recommended.
Author (GRA)

N77-11659# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
THE EFFECT OF PRE-ADAPTING SPECTRAL STIMULI ON VISUAL RESPONSE
Gloria Twine Chisum 30 Mar. 1976 27 p refs
(MR0410101)
(AD-A024312; NADC-76085-40) Avail: NTIS HC A03/MF A01 CSCL 06/16

Electroretinograms (ERGs) were recorded following pre-adapting exposures to radiometrically and photometrically matched spectral stimuli. The magnitudes of three aspects of the ERG varied as a function of the pre-adapting wavelength. Longer wavelength pre-adapting stimuli produced less suppression of the response parameters than stimuli from the short wavelength end of the spectrum. The implications of the findings for display design and cockpit-light-source design and management are discussed.
Author (GRA)

N77-11660# Naval Coastal Systems Lab., Panama City, Fla.
IMPROVED THERMAL PROTECTION AND REWARM PROCEDURES FOR COLD WATER DIVERS
M. W. Lippitt, Jr. and G. F. Bond Feb. 1976 86 p
(AD-A024213; NCSL-271-76) Avail: NTIS HC A05/MF A01 CSCL 06/19

A series of tests were made to evaluate the thermal effectiveness of variable volume dry diving suits equipped with a NASA Project Apollo urine collection device compared to SDV wet suits. Six-hour dives at water temperatures from 35 F were successfully completed with no apparent problems except cold feet. Breathing gas consumption, oxygen consumption, and carbon dioxide production were measured during the dives which included rest, and intermittent light and moderate exercise. A rewarm technique involving the circulation of hot water around the torso area in a rewarm garment was evaluated using subjects in microchronic and acute hypothermia. The method was found to produce a rapid return to thermal equilibrium with a small rectal temperature afterdrop.
Author (GRA)

N77-11661# School of Aerospace Medicine, Brooks AFB, Tex.
PRINCIPLES OF BIODYNAMICS. VOLUME 3: PHYSIOLOGICAL MECHANISMS IN THE MAMMAL UNDERLYING POSTURE, LOCOMOTION, AND ORIENTATION IN SPACE
Irving H. Wagman and Willie K. Dong Dec. 1975 100 p refs
(AF Proj. 7930)
(AD-A023691; SAM-Review-7-75-vol-3) Avail: NTIS HC A05/MF A01 CSCL 06/19

This review describes those physiological mechanisms in the peripheral and central nervous system which underlie posture, locomotion, and orientation in space. Particular emphasis is given to the input-output relationships and integration of the central nervous mechanisms. The mechanisms discussed involve many structures of the nervous system and are both gravity and nongravity dependent. The otolith organ of the vestibular labyrinth is probably the only specific gravity sensor in the vertebrate. However, gravity has a further direct effect in maintaining posture and orientation by exerting a force which results in slight stretch of the muscles of the limbs, head, and neck and thereby gives rise to reflex contractions which help maintain the body in its normal relationship in space. Nongravity-dependent mechanisms, especially those involving the semicircular canals, oculomotor system, and visual system, are also of the utmost importance in supplementing the gravity-dependent mechanisms during all aspects of orientation.
GRA

N77-11662# School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF 1.6 GHz RADIATION ON NEUROTRANSMITTERS IN DISCRETE AREAS OF THE RAT BRAIN Interim Report, 1 Jan. - 1 Aug. 1975
James H. Merritt, Richard H. Hartzell, and James W. Frazer Feb. 1976 15 p refs
(AF Proj. 7757)
(AD-A023677; SAM-TR-76-3) Avail: NTIS HC A02/MF A01 CSCL 06/18

Rats were exposed to 1.6 GHz radiation at a measured power density of 80 mW/sq cm for 10 minutes. Rectal temperature rise was 4 C. Hyperthermal control rats were exposed to warm air environment to raise core temperature 4 C. Hypothalamic norepinephrine was decreased in the irradiated and hyperthermal animals compared to the normothermal controls. Hippocampal serotonin was decreased in the irradiated but not in the hyperthermal animals as was the dopamine content of the corpus striatum and hypothalamus. The changes noted fit well with power distribution determined by thermographic imagery of irradiated rats, and indicate that these changes are the result of the microwave-induced hyperthermia.
Author (GRA)

N77-11663# Office of Naval Research, London (England).
AQUEOUS ARTEFACTS: THE RIDDLE OF BOUND WATER
J. B. Bateman Apr. 1976 25 p refs
(AD-A024643; ONRL-R-3-76) Avail: NTIS HC A02/MF A01 CSCL 07/2

This paper, intended for the general reader, first discusses early ideas about water binding in biological systems. More recent work is presented in the form of a report and commentary on lectures given during a Royal Society discussion meeting, together with occasional references to other literature and to papers given at a somewhat similar symposium in Roscoff. The conclusion to be drawn is probably that although the acceptable definition of bound water is in doubt and the interpretation of experimental data frequently ambiguous, water binding to biological macromolecules to the extent of about 0.3 - 0.5 g.water/g.dry weight is fairly general. Further, there is evidence that the rates of many biological reactions may be controlled both by direct consumptive participation and by catalytic shifts of water molecules attached in and around receptor sites. A current controversy concerning the role of 'structured' water in active transport recalls similar disputes among the earlier proponents and opponents of water binding, dating probably from Overton's introduction of the idea in 1902.
GRA

N77-11664# Ohio State Univ., Columbus. Dept. of Aeronautical and Astronautical Engineering.
CARDIOVASCULAR, RENAL AND RESPIRATORY EFFECTS OF HIGH INTENSITY, INTERMEDIATE DURATION, LOW FREQUENCY VIBRATION Interim Scientific Report, 1 Jun. 1974 - 30 Jun. 1975
Robert M. Nerem and Robert L. Hamlin 18 Jul. 1975 47 p refs
(Grant AF-AFOSR-2526-73; AF Proj. 9777; OSURF Proj. 3656-A)
(AD-A025098; AFOSR-76-0545TR; Rept-3656-2; ISR-2) Avail: NTIS HC A03/MF A01 CSCL 06/19

A research program on the influence of high intensity, intermediate duration, low-frequency wholebody vibration on the cardiovascular, renal and respiratory system is described. During the period 1 June 1974 to 30 June 1975, the major emphasis

was on the in vitro study of the transport of I 131-albumin between blood and the arterial wall in the presence of oscillatory flow and pressure conditions. A previous series of in vivo experiments has also been extended to include the frequencies of 6 and 14 Hz. These in vivo data indicate an enhancement of albumin uptake in the dog aorta in the presence of vibration and are consistent with the in vitro data and the concept of a shear dependent transport process. An in vitro study of blood-arterial wall cholesterol transport has also been initiated and in vivo measurements of aortic pressure and velocity waveforms in the presence of wholebody vibration are being continued. Author (GRA)

N77-11665 Colorado Univ., Boulder.
MAJOR GENE ANALYSIS: AN ALTERNATIVE APPROACH TO THE STUDY OF THE GENETICS OF HUMAN BEHAVIOR Ph.D. Thesis
Pamela Rae Fain 1976 121 p
Avail: Univ. Microfilms Order No. 76-23607

Expectations for the relationship between sibship mean and sibship variance when a quantitative character is influenced by a major gene were derived. An autosomal additive locus, a locus with complete dominance, a sex-linked additive locus and a sex-linked dominant were considered. In every case, a systematic relationship between sibship variance and sibship mean was shown to exist. These patterns were confirmed in samples of data simulated to fit a number of genetic models by testing the effects of the linear, quadratic and cubic terms of sibship mean on the logarithm of sibship variance. Maximum likelihood distribution analyses of simulated samples indicated that this technique may be very useful in decomposing mixtures of genotypic distributions. In general, however, the hypothesis that a single normal distribution also fits the data can rarely be rejected, and the method may be very sensitive to unequal variance within genotypes. Dissert. Abstr.

N77-11666*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AN EXPERIMENTAL STUDY FOR DETERMINING HUMAN DISCOMFORT RESPONSE TO ROLL VIBRATION
Jack D. Leatherwood, Thomas K. Dempsey, and Sherman A. Clevenson Nov. 1976 29 p refs
(NASA-TN-D-8266; L-10789) Avail: NTIS HC A03/MF A01 CSCL 05H

An experimental study using a passenger ride quality apparatus (PROA) was conducted to determine the subjective reactions of passengers to roll vibrations. The data obtained illustrate the effect upon human comfort of several roll-vibration parameters: namely, roll acceleration level, roll frequency, and seat location (i.e., distance from axis of rotation). Results of an analysis of variance indicated that seat location had no effect on discomfort ratings of roll vibrations. The effect of roll acceleration level was significant, and discomfort ratings increased markedly with increasing roll acceleration level at all roll frequencies investigated. Of particular interest, is the fact that the relationship between discomfort ratings and roll acceleration level was linear in nature. The effect of roll frequency also was significant as was the interaction between roll acceleration level and roll frequency. Author

N77-11667*# Boeing Co., Wichita, Kans.
USER EVALUATION OF RIDE TECHNOLOGY RESEARCH Final Report
J. R. McKenzie and S. H. Brumaghim Washington NASA Nov. 1976 63 p refs
(Contract NAS1-13908)
(NASA-CR-2746; D3-11015-1) Avail: NTIS HC A04/MF A01 CSCL 05H

The 23 organizations queried represent government, carrier, and manufacturing interests in air, marine, rail, and surface transportation systems. Results indicate a strong need for common terminology and data analysis/reporting techniques. The various types of ride criteria currently in use are discussed, particularly in terms of their respective data base requirements. A plan of action is proposed for fulfilling the ride technology needs identified by this study. Author

N77-11668# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
S2 PROBABILITY AND CNV (CONTINGENT NEGATIVE VARIATION)
R. Naeaetaenen, A. W. K. Gaillard, and S. Maentysalo 1975 9 p refs
(IZF-1975-11; TDCK-66921) Avail: NTIS HC A02/MF A01

The relationship between the CNV and expectancy which was operationalized as the probability of the occurrence of S2 was investigated. Five within-block probabilities were used: .10, .30, .50, .70, .90, and 1.00. It was attempted to separate the effects of motor preparation and expectancy by comparing the probability effect on the CNV in a reaction time task with that in a signal detection task. Because largest amplitudes were obtained at sub-maximal probabilities, the CNV seems to be related more to event-uncertainty than to expectancy. The results are difficult to interpret because of the low amplitudes obtained, especially in the signal-detection condition. The low amplitudes are explained in two ways. First, it is possible that, a motor response is a necessary condition to secure a reasonable size of CNV; second, in the reaction-time task motor preparation may be suppressed by the low discriminability of S2. Author (ESA)

N77-11669 Carnegie-Mellon Univ., Pittsburgh, Pa.
AN APPLICATION OF WIENER ANALYSIS TO HUMAN VISUAL PSYCHOPHYSICAL RESPONSE Ph.D. Thesis
Larry Allen Abel 1976 200 p
Avail: Univ. Microfilms Order No. 76-23469

The correlation in time presented by Lee Schetzen is replaced by ensemble averaging down a set of stimulus waveforms. This method of analysis is suited for use in those areas of visual psychophysics where the input is a grating of fixed spatial extent and the output is some number corresponding to the perceived contrast of the grating. Expressions for the variance of the kernel estimates produced by this technique are given. Models of the contrast perception mechanism are developed in both spatial domain or single channel and frequency domain or multiple channel configurations. These models were analyzed using the adaptation of Wiener analysis previously presented. Some of the frequency domain models were also studied analytically by representing them in terms of a Taylor series expansion.
Dissert. Abstr.

N77-11670*# Scientific Translation Service, Santa Barbara, Calif.
EQUIPMENT FOR THE COSMONAUT
Ts. Olegov and G. Sergeyev Washington NASA Nov. 1976 20 p Transl. into ENGLISH from Nauka i Zhizn (USSR), no. 9, Sep. 1976 p 27-32
(Contract NASw-2791)
(NASA-TT-F-17275) Avail: NTIS HC A02/MF A01 CSCL 13I

Problems are discussed for technical maintenance in space, and the instruments to be used for this purpose. Methods of using these instruments under weightless conditions are also described. Author

N77-11671*# Umpqua Research Co., Myrtle Creek, Ore.
ELECTROLYTIC PRETREATMENT UNIT GASEOUS EFFLUENT CONDITIONING Final Report
Gerald V. Colombo and David F. Putnam Aug. 1976 53 p refs
(Contract NAS9-14217)
(NASA-CR-151101; URC-60801) Avail: NTIS HC A04/MF A01 CSCL 06B

The electrolytic pretreatment of urine is an advanced process that eliminates the need for handling and storing the highly corrosive chemicals that are normally used in water reclamation systems. The electrolytic pretreatment process also converts the organic materials in urine to gases (N2 and O2) that can be

used to replenish those lost to space by leakage, venting, and air lock operations. The electrolytic process is more than a pretreatment, since it decreases the urine solids content by approximately one third, thus reducing the load and eventual solids storage requirements of the urine processing system. The evolved gases from the pretreatment step cannot, however, be returned directly to the atmosphere of a spacecraft without first removing several impurities including hydrogen, chlorine, and certain organic compounds. A treatment concept was developed that would decrease the impurities in the gas stream that emanates from an electrolysis unit to levels sufficiently low to allow the conditioned gas stream to be safely discharged to a spacecraft atmosphere. Two methods were experimentally demonstrated that can accomplish the desired cleanup. The bases of the two methods are, repectively: (1) raw urine scrubbing and (2) silica gel sorption. Author

N77-11672*# Life Systems, Inc., Cleveland, Ohio.
EVALUATION OF A SPACECRAFT NITROGEN GENERATOR Annual Status Report
R. D. Marshall and J. D. Powell Sep. 1976 68 p refs
(Contract NAS2-8732)
(NASA-CR-137930; LSI-ER-251-10-1) Avail: NTIS HC A04/MF A01 CSCL 06K

A method is discussed of generating nitrogen for cabin leakage makeup aboard space vehicles having longer duration missions. The nitrogen generation concept is based on using liquid hydrazine as the stored form of nitrogen to reduce the higher tankage and expendables weight associated with high pressure gaseous or cryogenic liquid nitrogen storage. The hydrazine is catalytically dissociated to yield a mixture of nitrogen and hydrogen. The nitrogen/hydrogen mixture is then separated to yield the makeup nitrogen. The excess supply of hydrogen would be available for use in the reduction of metabolic carbon dioxide. A detailed comparison was completed of Palladium/Silver and Polymer Electrochemical-based Nitrogen Generation Systems. The palladium/silver-based system was judged better than the Polymer Electrochemical Nitrogen Generation System because of lower expendable weight and palladium/silver nitrogen/hydrogen separation represents 'off-the-shelf' technology. Author

N77-11673*# Vought Corp., Dallas, Tex. Systems Div.
DEVELOPMENT AND FABRICATION OF AN ADVANCED LIQUID COOLING GARMENT Final Report
J. R. Leith and C. W. Hixon 22 Oct. 1976 87 p refs
(Contract NAS2-9026)
(NASA-CR-137974; Rept-2-53230/6R-51388) Avail: NTIS HC A05/MF A01 CSCL 06Q

The elastomeric film fin/tube concept which was developed is a composite of polyurethane film, fine expanded silver mesh, a serpentine pattern polyurethane transport tubing and an integral comfort liner, all bonded via adhesive application and vacuum-bagged for final cure. As demonstrated by thermal analysis, the composite garment material is capable of removing a 293 watt (1000 BTU/hr) metabolic load through a head and torso cooling area of .46 sq m (5 sq ft) with tube spacing of slightly under one inch. A total of 60 test elements, each .15m x .15m (6 in. x 6 in.) were fabricated in support of the liquid cooling garment concept development. In parallel with the fabrication of these elements a continuing series of laboratory tests to support the fabrication techniques was carried out. The elements and supporting tests are described. Author

N77-11674*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PILOT WORKLOAD AND FATIGUE: A CRITICAL SURVEY OF CONCEPTS AND ASSESSMENT TECHNIQUES
Walter B. Gartner (Adex Systems) and Miles R. Murphy Washington Nov. 1976 60 p refs
(NASA-TN-D-8365; A-6630) Avail: NTIS HC A04/MF A01

The principal unresolved issues in conceptualizing and measuring pilot workload and fatigue are discussed. These issues are seen as limiting the development of more useful working concepts and techniques and their application to systems engineering and management activities. A conceptual analysis of pilot workload and fatigue, an overview and critique of approaches to the assessment of these phenomena, and a discussion of current trends in the management of unwanted workload and fatigue effects are presented. Refinements and innovations in assessment methods are recommended for enhancing the practical significance of workload and fatigue studies. Author

N77-11675*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ASTP CHEMICAL AND MICROBIOLOGICAL ANALYSIS OF POTABLE WATER
Richard L. Sauer and Scott A. Leslie Oct. 1976 12 p refs
(NASA-TM-X-58192; JSC-11578) Avail: NTIS HC A02/MF A01 CSCL 06K

The Apollo-Soyuz Test Project procedures for potable water system servicing and the results of preflight and postflight chemical and microbiological analyses of the water are discussed. Tables show results of the analyses. The effectiveness of the water system is evaluated. Author

N77-11676*# Umpqua Research Co., Myrtle Creek, Ore.
DEVELOPMENT ASSESSMENT OF WASH WATER RECLAMATION Final Report
David F. Putnam Aug. 1976 90 p refs
(Contract NAS2-8239)
(NASA-CR-137934; URC-60806) Avail: NTIS HC A05/MF A01 CSCL 06K

An analytical study assessment of state-of-the-art wash water reclamation technology is presented. It covers all non-phase-change unit operations, unit processes and subsystems currently under development by NASA. Each approach to wash water reclamation is described in detail. Performance data are given together with the projected weights and sizes of key components and subsystems. It is concluded that a simple multifiltration subsystem composed of surface-type cartridge filters, carbon adsorption and ion exchange resins is the most attractive approach for spacecraft wash water reclamation in earth orbital missions of up to 10 years in duration. Author

N77-11677*# Energy Research Corp., Danbury, Conn.
DEVELOPMENT OF A PROTOTYPE REGENERABLE CARBON DIOXIDE ABSORBER
Michael Onischak 10 Sep. 1976 26 p refs
(Contract NAS2-8644)
(NASA-CR-137919) Avail: NTIS HC A03/MF A01 CSCL 06K

Design information was obtained for a new, regenerable carbon dioxide control system for extravehicular activity life support systems. Solid potassium carbonate was supported in a thin porous sheet form and fabricated into carbon dioxide absorber units. Carbon dioxide and water in the life support system atmosphere react with the potassium carbonate and form potassium bicarbonate. The bicarbonate easily reverts to the carbonate by heating to 150 deg C. The methods of effectively packing the sorbent material into EVA-sized units and the effects of inlet concentrations, flowrate, and temperature upon performance were investigated. The cycle life of the sorbent upon the repeated thermal regenerations was demonstrated through 90 cycles. Author

N77-11678# Committee on Science and Technology (U. S. House).
CREW TRAINING AND SUPPORT ACTIVITIES
Washington GPO 1976 49 p Hearing before Subcomm. on Space Sci. and Applications of Comm. on Sci. and Technol., 94th Congr., 2d Sess., 22 Jun. 1976
(GPO-75-984) Avail: Subcomm. on Space Sci. and Applications

The current status of crew training for the space shuttle program is briefly reviewed. J.M.S.

N77-11679# Stanford Univ., Calif. Dept. of Civil Engineering.
CONTINUING RESEARCH IN THE DEVELOPMENT OF INTERACTIVE MAN-COMPUTER SYSTEMS FOR ENGINEERING-CONSTRUCTION PROJECTS Final Report, 1 Apr. 1974 - 30 Sep. 1975
Boyd C. Paulson, Jr. Sep. 1975 68 p refs
(Grant NSF GK-42132)
(PB-252927/9; TR-200; NSF/GK-42132/SU-TR-200) Avail: NTIS HC A04/MF A01 CSCL 13B

An interactive man-computer environment is reported to develop, implement and test hypotheses and systems involving integrated network models for the planning and control of resources and operations on large engineering-construction projects. Examples include rapid transit systems, nuclear power plants, and mining developments. GRA

N77-11680# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.
COMPUTERIZED ANALYSIS OF EYE MOVEMENTS DURING STATIC DISPLAY VISUAL SEARCH Interim Report, Jun. 1973 - Apr. 1975
Harry Snyder and Donald F. Taylor Wright-Patterson, AFB, Ohio AMRL Feb. 1976 78 p refs
(Contract F33615-71-C-1739; AF Proj. 7183)
(AD-A024100; AMRL-TR-75-91) Avail: NTIS HC A05/MF A01 CSCL 17/8

A computerized analysis technique was developed for the evaluation of eye movements. This technique, when applied to eye movement data of 1 millisecond temporal resolution, is considered useful to evaluate such eye movement parameters as fixation duration, interfixation distance, and number of fixations per trial. This analysis technique was evaluated for displays having a single target and up to 192 nontargets in a static display. The results indicate that fixation duration is unaffected by the density of nontargets, but that the mean interfixation distance decreases linearly with increases in nontarget density. Due to this decrease in interfixation distance, the search time and the number of fixations per trial increase linearly with the density of nontargets. An overall evaluation of the eye movement measuring device is offered. Author (GRA)

N77-11681# GCA Corp., Bedford, Mass. Technology Div.
DESIGN, DEVELOPMENT, FABRICATION AND TESTING OF A PORTABLE SELF-CONTAINED RESPIRABLE DUST MASS MONITOR
Pedro Lilienfeld 25 Oct. 1974 58 p refs
(Contract H0232039)
(PB-254503/6; BM-OFR-73-76) Avail: NTIS HC A04/MF A01 CSCL 14B

An airborne mass monitor for unattended and recording measurements of the concentration of dust in mining environments is described. Sensing collection are performed by beta-radiation attenuation and inertial implementation, respectively. The instrument is portable, battery or line operated provides a digital printout of the mass concentration during each selection sampling period, as well as the accumulated mass of dust, and the elapsed sampling time. GRA

N77-11682# Frankford Arsenal, Philadelphia, Pa.
REDUCTION OF TARGET DETECTABILITY BY LASER PROTECTIVE MATERIALS
Gerald C. Hoist Apr. 1976 22 p refs
(DA Proj. 1T1-61102-AH-46)
(AD-A024383; FA-TR-76021) Avail: NTIS HC A02/MF A01 CSCL 05/5

An ideal laser protection material will provide the required optical density at the laser wavelength and be transparent at all other wavelengths. Although there are many ways to formulate a quality factor, the present study examines a method of combining luminous transmission with the detectability of low contrast targets. The present study examines how detectability of low contrast targets is affected by two popular ruby laser protectors. In order to study the effect of color rendition only, neutral density filters were used to equate the luminous transmission of the two goggles. Theoretical considerations of how these goggles might perform is given. To obtain the effects of protective materials on detectability, the contrast required for the detection of various achromatic targets was measured. The targets consisted of fourteen gratings which subtended visual angles from 2.26 minutes per line pair up to 68.4 minutes per line pair. GRA

N77-11683# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.
DYNAMIC CONTRAST REQUIREMENTS Final Report
Leon G. Williams and Judith M. Erickson Feb. 1976 93 p refs
(Contract N00014-74-C-0076; NR Proj. 215-229)
(AD-A023973; Rept-76-SRC/6; ONR-CR215-229-2F) Avail: NTIS HC A05/MF A01 CSCL 05/5

Three experiments were conducted to investigate the spatial and temporal relationship between the human visual system and displayed imagery. In Experiment I, contrast sensitivity for sinusoidal gratings was determined as a function of spatial frequency, temporal frequency, luminance, and stimulus position on the retina. In Experiment II, contrast sensitivity for sinusoidal grids was determined as a function of the horizontal and vertical spatial frequency, and temporal frequency. In Experiment III, sinusoidal grating targets on grating surrounds were used to determine contrast sensitivity as a function of target spatial frequency, surround spatial frequency, and temporal frequency. The data from the three experiments indicate how much contrast is required under specified conditions to just detect a noise-free target defined in terms of its spatial and temporal frequency content. The results provide a means for predicting the visibility of targets in real displays. GRA

N77-11684# Human Engineering Labs., Aberdeen Proving Ground, Md.
INFLUENCE OF PILOT INCAPACITATION ON LOW SPEED AND HOVERING FLIGHT Final Technical Report
Douglas P. Harvey and John D. Waugh Jan. 1976 37 p refs
(AD-A023728; HEL-TM-7-76) Avail: NTIS HC A03/MF A01 CSCL 05/5

Very little quantitative information exists as to survivability of a lone or surviving helicopter pilot who is incapacitated by wounds received during a mission. Since the pilot normally uses all four limbs, his ability to maintain control of an otherwise flyable aircraft is expected to be impaired. A safe, yet realistic approach to the investigation was to physically restrain single hands, limbs, etc. of Army aviators hovering a DHT-1 Whirlymite Trainer--a semitethered but otherwise genuine single-place helicopter. The relative accuracy with which subjects followed a prescribed flight path under the restraints was the primary means of comparison. Statistical analysis of integrated error scores showed that the only effective restraints were those involving an entire limb. Since this investigation only involved hovering flight, recommendations included further work in cruise considerations in favor of multiple-limb restraints. GRA

N77-11685# Michigan Univ., Ann Arbor. Mental Health Research Inst.
TARGET DETECTION IN RAPIDLY-CHANGING VISUAL SEQUENCES Final Report
Irwin Pollack Mar. 1976 32 p refs
(Contract N00014-67-A-0181-0051; NR Proj. 197-022)
(AD-A023784) Avail: NTIS HC A03/MF A01 CSCL 05/10

Sequences of digits were painted upon a display scope under conditions of a stationary window (window fixed, moving sequence) and of a moving window (sequence fixed, moving window). Performance was examined under a variety of window-sizes and rates of presentation. Unlike the reading of English text with long-term sequential constraints, the present task could be specified by only two successive digits. Nevertheless, the accuracy of target detection improved with window size in a manner not unlike that reported for English text. The results are discussed. GRA

N77-11686# Systems Research Labs., Inc., Dayton, Ohio.
COMPARISON OF HUMAN INFORMATION PROCESSING PERFORMANCE WITH DOT AND STROKE ALPHABETIC CHARACTERS Interim Report, Jan. 1974 - Jun. 1975
Robert D. ODonnell and Frank E. Gomer Jan. 1976 23 p refs
(Contract F33615-72-C-0235; AF Proj. 7184)
(AD-A024099; AMRL-TR-75-95) Avail: NTIS HC A02/MF A01 CSCL 05/5

Recent engineering developments have stimulated interest in the use of displays which will present alphanumeric information in dot format. In order to supply human factors data on how information presented in punctate form is processed, the Sternberg item recognition procedure was used and discrimination reaction time (RT) to both dot and stroke letters was determined under various amounts of memory load. In addition, the visually evoked response (VER) of the electroencephalogram was recorded during RT performance and compared as a function of symbology format. These results suggest that dot letters require slightly longer (less than 10 msec) to encode than stroke letters. However, subsequent to about 200 msec after the letter is presented, no statistically significant differences appear in either RT or VER data, suggesting that once the letter is encoded it is processed equally well whether the original format was dot or stroke. In addition, no evidence of increased work load, greater errors, or other performance decrement was seen with the dot format used here. Under the conditions tested, subjects were apparently able to compensate for the additional encoding time with little effort and with no demonstrable effect on overall performance. GRA

N77-11687# Illinois Univ., Urbana. Aviation Research Lab.
ENHANCEMENT OF HUMAN EFFECTIVENESS IN SYSTEM DESIGN, TRAINING, AND OPERATION: JULY 1974 - JUNE 1975 Final Report
Stanley N. Roscoe and Charles O. Hopkins Jul. 1975 35 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-A023941; ARL-75-21/AFOSR-75-10; AFOSR-76-0476TR)
Avail: NTIS HC A03/MF A01 CSCL 05/8

This report is part of a study on residual attention, information load, and pilot performance. It has resulted in: (1) General rules and prediction equations for evaluation of task load and operator efficiency; (2) Discrimination of individual differences in attention and assessment of their predictive validity to operational performance; (3) Development of training procedures for timesharing; and (4) Application of feedback control theory to operator tracking performance in timesharing. Investigation of adaptive logic in acquisition of perceptual-motor skills included a review of literature on adaptive training with emphasis on current theoretical models of perceptual motor skills. Experiments were designed to investigate the role of proprioceptive and visual response-produced feedback during motor learning, and the effects of changing response-produced feedback after the same or after different amounts of practice. GRA

N77-11688# Illinois Univ., Urbana. Coordinated Science Lab.
CONTROL AND TRAJECTORY OPTIMIZATION OF A ROBOT ARM
Kar-Keung David Young Nov. 1975 218 p refs Sponsored in part by NSF
(Contract DAAB07-72-C-0259; Grant AF-AFOSR-2570-73)
(AD-A023669; R-701; UILU-ENG-75-2236) Avail: NTIS HC A10/MF A01 CSCL 06/4

In the past few years robot arms or computer-controlled manipulators have been developed in several Artificial Intelligence research laboratories in the United States. The purpose of designing and building these robot arms is to use them as devices to perform physical tasks. The movements of the robot arms are required to be similar to humans'. Conventional positioning servos implemented on industrial robots are no longer applicable. This study concentrates on finding optimal arm trajectories and possible control strategies for a two-link robot arm whose motion is confined to the vertical plane. As the mathematical model for a six-degrees-of-freedom robot arm is highly nonlinear, it is intended to first investigate a simpler arm and hopefully develop control strategies that can be generalized to the more complex arms. Various approaches are taken towards trajectory optimization. An optimal feedback control scheme is developed for this arm and is generalizable to the six-degrees-of-freedom robot arm. GRA

N77-11689# Pritsker and Associates, Inc., West Lafayette, Ind.
SAINT II DOCUMENTATION MANUAL Final Report
David B. Wortman, C. Elliott Sigal, A. Alan B. Pritsker, and Deborah J. Seifert Wright-Patterson AFB, Ohio AMRL Dec. 1975 229 p refs
(Contract F33615-74-C-4005; AF Proj. 7184)
(AD-A024286; AMRL-TR-75-116; AMRL-HESS-74-4) Avail: NTIS HC A11/MF A01 CSCL 05/5

A network modeling and analysis technique called SAINT II has been developed to model and analyze complex Air Force man-machine systems. The modeling vehicle developed is a set of network symbols and terminology and the analysis vehicle is computer simulation. SAINT 2 obtains system performance measures for networks that represent a mission consisting of a set of tasks performed by a crew of operators having a complement of equipment in the face of environmental factors. These system performance measures are obtained via a simulation approach. Human engineering considerations are reflected in the modeling technique by means of task parameter specifications, task precedence and sequencing relations, and psycho-social and environmental factors affecting crew performance. This report describes the SAINT 2 simulation program, which includes a number of new capabilities not available in the original SAINT program. GRA

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